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TERRAE INCOGNITAE: THE PLACE OF THE IMAGINATION IN GEOGRAPHY*

JOHN K. WRIGHT
American Geographical Society

TERRA INCOGNITA: these words stir the imagination. Through the ages men have been drawn to unknown regions by Siren voices, echoes of which ring in our ears today when on modern maps we see spaces labelled "unexplored," rivers shown by broken lines, islands marked "existence doubtful." In this address I shall deal with *terrae incognitae,* both literal and as symbolizing all that is geographically unknown; I shall discuss the appeal that they make to the imaginative faculties of geographers and others and the place of the imagination in geographical studies.

THE SIRENS OF TERRAE INCOGNITAE

In earlier times literal *terra incognita* was seldom far from the hearthfires of men. To our stone-age ancestor a blue mountain range on the horizon might have marked its border. Beyond lay a country—of evil spirits, perhaps—into which he must often have wished to penetrate but dared not. If, finally, curiosity mastered his dread and with a few hardy companions he crossed the forbidden range, as like as not he found a region not so greatly different from his own. Thus the encircling border was pushed back a little way and a short step taken in a process that has not even yet quite reached its end. But although our stone-age ancestors and their descendants down until the dawn of modern times moved back the rim of *terra incognita* bit by bit, their "known world" was only a pool of light in the midst of a shadow—limitless, for all that was definitely understood and proven. Voyages into this shadow became a favorite theme of poets and story tellers—the theme of the Argonautic myth and the *Odyssey,* of the legends of Sinbad and Saint Brandan. Out of its darkness wild hordes poured forth from time to time to carry fire and sword across Europe—Scyths, Huns, Tartars; it was a mysterious shadow, whence came rumors of strange men and monsters, of the priestly empire of Prester John, of the Apocalyptic tribes of Gog and Magog shut behind Alexander's wall until, on the day of judgment, they shall burst out to ravage the world. *Terra incognita* was not without contact with

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the known world, and throughout most of history awareness of its menacing presence must have aroused an abiding wonder in all but the least imaginative.

Possibly this wonder became rooted in the inheritable subconscious of sensitive folk and was thus transmitted from generation to generation down to our day; but, whether or not so inherited, the innermost impulse that makes us take satisfaction in geographical studies seems akin to the urge that impelled our stone-age forefathers toward the lands beyond the range. In the course of field work or on a summer holiday we have all climbed a mountain and gazed over uninhabited and unfamiliar country. Behind us has lain the valley out of which we have come, the farm or ranch where we have sojourned. Before us has spread, if not a land unknown to the United States Geological Survey, at least a personal *terra incognita* of our own. In the contemplative mood that mountain tops induce, we have brooded over the view, speculated on the lay of the land, experienced a pleasurable sense of the mysterious—perhaps felt even a touch of the sinister. We have heard the Sirens' voices.

The Sirens, of course, sing of different things to different folk. Some they tempt with material rewards: gold, furs, ivory, petroleum, land to settle and exploit. Some they allure with the prospect of scientific discovery. Others they call to adventure or escape. Geographers they invite more especially to map the configuration of their domain and the distribution of the various phenomena that it contains, and set the perplexing riddle of putting together the parts to form a coherent conception of the whole. But upon all alike who hear their call they lay a poetic spell.

Nowadays geographers seldom or never have the opportunity to enter literal *terrae incognitae*—totally unexplored territories—and at first glance it may seem far-fetched to compare the allurement of such unknowns with the attraction that draws us toward the regions and problems with which we must actually be concerned. However, the Siren voices heard by a Columbus, a Magellan, or a Livingstone differed only in intensity but not in tone and quality from those that call us to explore our seemingly more prosaic and humdrum *terrae incognitae*. Let us, therefore, examine a little further into the nature of *terrae incognitae* of various magnitudes and types.

SOME VARIETIES OF TERRAE INCOGNITAE

Obviously, whether or not a particular area may be called "unknown" depends both on whose knowledge and on what kind of knowledge is taken into account. As used literally on the early European maps, the words *terra incognita* signified a land unknown to the map maker after he had presumably consulted all available sources of information; but if such "unknown territories" were beyond the ken of the geographers and cartographers of Western civilization, they were known to their inhabitants, if any, and frequently to peoples of other civilizations as well. China lay deep in the heart of *terra incognita* to the Romans, but the Roman Empire was equally lost in "unknown land" to the Chinese. We are familiar with maps depicting the extent of the "known world" at different dates, most of which illustrate, somewhat crudely, stages in the development of the geographical knowledge of a single cultural tradition, that of the West. To round out the record, similar maps would be re-

quired for other traditions, showing the progress of the regional knowledge of Chinese, Japanese, Arabs, Hindus, Mayas, and other less advanced peoples. It would also be revealing if the dynamics of this process could be illustrated cartographically, as, for example, in the sixteenth century when the establishment of contact between Europe and the Far East produced a partial coalescence of the known worlds of Occidental and of Chinese geography.

When we say "the world as known to the Greeks of the time of Eratosthenes" or "to the Americans in 1945 A.D." we mean the areas about which certain Greeks and certain Americans were in a position to ascertain something without having to conduct exploring expeditions for the purpose. The world as actually known to the great majority of Greeks or Americans was smaller. That which is *terra incognita* for all practical purposes to an isolated community of hill-billies, is more extensive than that which is *terra incognita* to the members of this Association. Hence, depending on our point of view, there are personal, community, and national *terrae incognitae:* there are the *terrae incognitae* to different cultural traditions and civilizations; and there are also the *terrae incognitae* to contemporary geographical science.

The meaning of *terra incognita* depends no less on the kind of knowledge that we are considering. There are two grades of geographical knowledge: knowledge of observed facts and knowledge derived by reasonable inference from observed facts, with which we fill in the gaps between the latter. On the basis of reasonable inference, for example, I *know* that the climate in those parts of Antarctica that have never been seen by human eyes is too cold to support tropical rain forests, and that it is too warm and dry in the unexplored heart of Southern Arabia for tundras and ice fields. Thus, if *terra incognita* be conceived in an absolute sense as an area concerning which total human ignorance prevails, no *terrae incognitae* exist today on the earth's surface. At no place on this planet is the shadow so utterly dark as it was in former times. Science has reached a point where we may interpolate sound, if incomplete, geographical knowledge into every gap.

I have a summer place on the Maine coast. You geographers know nothing of it except what you could reasonably infer from your general familiarity with the region in which it lies. You might infer something about its climate, and you could also draw some conclusions as to what it is *not,* as we do regarding the interior of Antarctica; but as to its relief, drainage, soils, vegetation, houses, roads, and other aspects of its internal geography no published information is available to you. You might fairly surmise that the vegetation includes firs, spruces, and tamaracks, but, for all that is really known to geographical science, my land might not have a single tree upon it. If, therefore, *terra incognita* be conceived as an area within which no observed facts are on record in scientific literature or on maps, the interior of my place in Maine, no less than the interior of Antarctica, is a *terra incognita,* even though a tiny one. Indeed, if we look closely enough—if, in other words, the cartographical scale of our examination be sufficiently large—the entire earth appears as an immense patchwork of miniature *terrae incognitae.* Even if an area were to be minutely

mapped and studied by an army of microgeographers, much about its geography would always remain unknown, and, hence, if there is no *terra incognita* today in an absolute sense, so also no *terra* is absolutely *cognita*.

THE IMAGINATION IN GEOGRAPHY

Naturally, other motives than our magnetic attraction toward the geographically unknown play their part in making and keeping us geographers. Satisfaction in what we know and in imparting it to others, as distinguished from curiosity regarding what we do *not* know, is often a powerful factor. We may relish the assimilative processes of collecting data in the field or library, or the intellectual process of thinking through complex problems, or the altruistic process of contributing something that we hope will be of use, or at least of interest, to our fellow men. But these motives are not distinctive of us as geographers, since they impel others besides ourselves. What distinguishes the true geographer from the true chemist or the true dentist would seem to be the possession of an imagination peculiarly responsive to the stimulus of *terrae incognitae* both in the literal sense and more especially in the figurative sense of all that lies hidden beyond the frontiers of geographical knowledge. Indeed, the more brightly the light of our personal knowledge shines upon a region or a problem, the more attracted we are by the obscurities within it or concerning its entire extent.

Geographical research seeks to convert the *terrae incognitae* of science into *terrae cognitae* of science; geographical education to convert personal *terrae incognitae* into personal *terrae cognitae*. In both cases the unknown stimulates the imagination to conjure up mental images of what to look for within it, and the more there is found, the more the imagination suggests for further search. Thus curiosity is a product of the imagination. Now, as to curiosity, it seems a little unfortunate that this word, used to designate a nosy, impertinent characteristic of monkeys, small children, and gossips, is also applied to the loftier and more impersonal impulse that drives the astronomer to search the depths of the universe and the geographer to penetrate the mysteries of *terrae incognitae*. "Wonder" would be a preferable term for the latter could we not experience wonder in contemplating things without seeking to understand them. At all events, the less imaginative we are, the less open to either wonder or curiosity, and geographers of weak imagination—for a few do exist, it must be admitted—are impelled by different motives. They follow in the footsteps of others, imitating stereotyped patterns, and, if their industry and imitative ability be considerable, they may succeed in teaching and even in research, serving well to maintain geography as it is and to advance it along beaten trails, if not to mark out new ones.

The imagination not only projects itself into *terrae incognitae* and suggests routes for us to follow, but also plays upon those things that we discover and out of them makes imaginative conceptions which we seek to share with others. In the words of the late Sir Douglas Newbold: "Knowledge must pass into vision, that state of mind and heart which does not merely swallow evidence, but changes that evidence

into a judgment, an appreciation, a living picture of a country."* Unlike the mental images that we can merely invoke from the memory—such as the remembrance of views once seen—an imaginative conception is essentially a new vision, a new creation, and consequently the less imaginative we are the less fresh and original will be our writing and teaching, and the less effective in stimulating the imaginations of others.

But a powerful imagination is a dangerous tool in geography unless it be used with care. Indeed, the imagination might better be compared to a temperamental horse than to an instrument that operates precisely and with objectivity. A highly sensitive function of the mind, it is easily swayed by subjective influences, and for this reason has come in for a share of the disrepute in which subjectivity is often held in scientific circles.

As I shall have a good deal to say about subjectivity in what follows, it may be well to stop here and analyze it. The disrepute in which it is held, I feel, is not altogether deserved and may be due to a mistaken belief that subjectivity is the antithesis of objectivity. Objectivity, we might all agree, is a mental disposition to conceive of things realistically, a disposition inherent partly in the will and partly in an ability to observe, remember, and reason correctly. The opposite of objectivity would, then, be a mental disposition to conceive of things unrealistically; but, clearly, this is not an adequate definition of subjectivity. As generally understood, subjectivity implies, rather, a mental disposition to conceive of things with reference to oneself—that is to say, either as they appear to one personally, or as they affect or may be affected by one's personal interests and desires. While such a disposition often does, in fact, lead to error, illusion, or deliberate deception, it is entirely possible to conceive of things not only with reference to oneself but also realistically. Were this not the case, the human race would long ago have become extinct. Thus we may distinguish between (1) strictly impersonal objectivity, (2) illusory subjectivity, and (3) realistic, or one might even say, objective, subjectivity. To illustrate: my conception of the skunk as a small furry animal with certain distinctive abilities—not, in this case, an imaginative conception—is impersonally objective; an unobservant person's wishful conception of a particular skunk as a cat, would be a product of illusory subjectivity; and a careful observer's accurate conception of a personal encounter with a particular skunk would be a product of realistic subjectivity.

There are three imaginative processes of importance in relation to geography, in each of which subjectivity of one form or another plays a large part. These might be called promotional, intuitive, and aesthetic imagining.

The first, promotional imagining, is controlled by a desire to promote or defend any personal interest or cause other than that of seeking the objective truth for its own sake. It is subjective imagining dominated by such emotions as bias, prejudice,

* In a passage from his inaugural lecture delivered at the Sudan Cultural Centre, quoted by R. A. Hodgkin, *Sudan Geography*, published by the Education Department of the Sudan Government, 1946, p. 147.

partiality, greed, fear, or even love, all of which may lead the imagination to produce illusory or deceptive conceptions conforming to what one would like rather than necessarily to the truth. Realistic subjectivity, however, may also influence promotional imagining. Passionate devotion to a personal or social cause may result in a no less passionate quest for realistic conceptions useful in advancing or defending that cause. Human greed for wealth and power and human partiality for particular forms of religious doctrine have yielded, as by-products, rich fruit in objective geographical knowledge.

The purpose of intuitive imagining, the second type, is objective, in that the intent here is to secure realistic conceptions. It is, nevertheless, a subjective process because it makes use of one's personal impressions of selected facts instead of impersonally considering and weighing all pertinent evidence. Much of the world's accumulated wisdom has thus been acquired, not from the rigorous application of scientific research, but through the skillful intuitive imagining—or insight—of philosophers, prophets, statesmen, artists, and scientists.

AESTHETIC IMAGINING

The third type of imagining—the type of which I should like to speak more especially—I have called "aesthetic," though I use this adjective reluctantly because of its frequent, though mistaken, mental association with the disagreeable noun "aesthete." Aesthetic imagining is merely a sub-species of promotional imagining, in which the dominant personal interest promoted is a desire to enjoy the process of imagining itself, and to give satisfaction to others by communicating the results in written or graphic form. The end purpose, therefore, is either the creation of an independent work of art or the introduction of artistry into a work of utility or of science. Much aesthetic imagining is the product of illusory subjectivity, of a disposition to create conceptions that are fictitious or fanciful, as when a painter paints a cow as she looks to no one else on God's earth. Much of it, however, is the result of realistic subjectivity, as when he paints the cow as she would look to you or me. This he can do either with or without the aid of aesthetic imagination. Not all cows are equally worthy of being painted and not all aspects of a given cow are equally worthy of emphasis. The imagination can guide the selection of a noteworthy cow to paint, or of an ordinary cow in a noteworthy setting, or of noteworthy aspects of either a noteworthy or an ordinary cow. And by the same token, a geographer may portray a place or region, either with conscientious but unimaginative attention to all details, or with aesthetic imagination in selecting and emphasizing aspects of the region that are distinctive or characteristic.

What is the attitude of geographers toward intuitive and aesthetic imagining? There are some who believe that we should explore only such *terrae incognitae* as lend themselves to exploration in accordance with rigorous scientific principles, that the purpose of such exploration should be to determine exactly what these *terrae incognitae* contain, and that in presenting the results to others we should aspire to strict, impersonal objectivity. It may be left, these say, to the artists, poets, phi-

losophers, novelists, and politicians to develop the aesthetic and intuitive faculties of their minds; geographers should keep to a straighter and narrower path.

Others concede that many types of geographical research cannot be pursued along strictly scientific lines and that there will long remain scope in geography for skillful intuitive, if not for aesthetic, imagining. Geography deals in large measure with human beings, and the study of human affairs and motives has not yet reached a stage in which more than a small part of it can be developed as a precise science. Until it arrives at that stage, much geographical study will have to be considerably tinged with intuitive subjectivity. But also among those who hold this view, the prevalent attitude toward aesthetic imagining in geography is one of distrust.

Unfortunately, this deep-seated distrust of our artistic and poetic impulses too often causes us to repress them and cover them over with incrustations of prosaic matter, and thus to become crusty in our attitude toward anything in the realm of geography that savors of the aesthetic. Like the companions of Ulysses we would row along with ears stopped to the Sirens' song. If a little of its melody penetrate through the stopping, we would try not to let others know. Ulysses himself, however, listened to the Sirens and as a consequence, if one may interpret the matter in a fanciful vein, his whole voyage assumed to him the aura that we sense on reading the Odyssey. Had his companions survived, their accounts of the expedition would have been strictly objective—factual, realistic, but uninspired, and, like some of the geography of today, soon forgotten. In Homer's words (as rendered by T. E. Lawrence), Ulysses returned "spirit gladdened and riper in knowledge," and hence his account has lived forever. He was well advised to hearken to the Sirens, to allow the charm of their voices to kindle his imagination, but nevertheless to have himself bound to the mast and so pass them by. If he had paid them a visit and yielded to their allurements, and then had the fortune to escape, he would have brought back a tale so unrealistic and sensational as to repel discriminating hearers, and his tale would have been forgotten even sooner, perhaps, than would the honest if prosaic stories of the members of his crew.

THE LEGITIMATE AND THE DESIRABLE IN AESTHETIC SUBJECTIVITY

Our undue fear of hearkening to the Sirens would seem to spring from three fairly widespread notions: first, that aesthetic subjectivity is always unscientific, leading to illusion and error; second, that it is out of place in geography, serving no necessary functional purpose; and third, that geographers, by and large, are not skilled in giving expression to aesthetic sensitivity and hence should avoid trying to do so.

In considering the validity of these three notions, I shall designate as "legitimate" such practices as do not actually interfere with the advancement of scientific geography, which is and should rightly be the primary concern of the majority of geographers, though not necessarily the exclusive concern of the totality of geographers. I shall designate as "desirable" such legitimate practices as also appear to promote the advancement either of scientific geography or of geography in a broader sense.

With regard to the first notion, it is, of course, true that aesthetic subjectivity may lead to illusion and error. There is, however, a distinction between illusion and delusion. We are by no means deluded by all of our illusions. Writers frequently create illusion for the express purpose of making more effective their exposition of truths, whether they do so merely by using an occasional metaphor like "the grapes of wrath," or "the hounds of spring," or by writing whole novels or epic poems. Illusion becomes delusion only when it is either designed to deceive or is unskillfully employed. Consequently, the test of the legitimacy of aesthetic subjectivity in geography is not whether or not it is illusory, but whether or not, if illusory, it leads to delusion, and it would seem entirely legitimate to enrich and add color and vividness to the style of an otherwise strictly objective geographical exposition by the use of subjective figures of speech and other aesthetic devices if they are so chosen and phrased as not to delude the reader.

Subjective elements may slip into a predominantly objective exposition in the form of words or phrases that carry emotional connotations. This also would seem legitimate provided the images that such words invoke in the reader's imagination correspond to the impressions that the majority of readers would receive in the presence of the phenomena described or exposed. We are often tempted to use such expressions as " a gloomy wood," "bitter cold," "a majestic mountain," "a menacing thunderhead," "the mysterious unknown." Budding geographers have been cautioned by their professors against employing such adjectives on the ground that they reflect the personal emotions of the writer and are not universal common denominators in the symbolism of science. A dark wood may not seem gloomy to a lumberjack, or fifty-below bitter cold to an Eskimo, or the Matterhorn majestic to all the peasants of Zermatt, or the geographically unknown mysterious to some of you. Such terms, however, are not likely to be delusive, and to cavil against their use, if it be discriminating and restrained, seems a little pedantic. Geographical works are intended to be read by persons who share a more or less common cultural heritage and whose subjective responses to like stimuli are similar. A phrase in D. G. Hogarth's "The Nearer East" has stuck in my memory for forty years: "the awful aridity of Sinai." Few readers of that book would remain unmoved with awe upon seeing the utterly barren mountains of the Sinaitic peninsula. Surely it is legitimate in a geographical work to convey this sense of awe to the reader, even though the Bedouins of Sinai may take its dryness as a matter of course.

Naturally, imaginative fancies that stem from some special idiosyncrasy or peculiar and passing emotional state of a writer, or that are merely whimsical, have no legitimate place in geographical expositions if they create false impressions. I should be exceeding the legitimate limits of the subjective were I to describe my Maine woodlot as an abode of hobgoblins, elves, and werewolves, even though my imagination might relish so picturing it on a moonlit night.

Thus, although aesthetic subjectivity may and often does lead to delusion and error, there are ways of expressing it that do not, and hence may be regarded as at least legitimate, whether or not desirable.

The second notion, that aesthetic subjectivity is out of place in geography—that, like so much window-dressing, it serves no functional purpose—brings up the question of desirability. The notion is mistaken. The functional purpose of aesthetic subjectivity is to heighten the effect by increasing the clarity and vividness of the conceptions that we seek to transmit to reader or hearer. It enables us to share with him the impressions that place or circumstance have made upon us—to bring him down to earth from the lofty observation point of the objective and make him see and feel through our eyes and feelings. Of course, there are limits beyond which this ceases to be desirable. A geographical exposition differs from a traveler's tale in which the reader can be held at the personal level throughout. In geography the subjective should be used only to point up the objective; never permitted to crowd it out.

It is sometimes argued that the style of a scientific exposition should be as clear, simple, and concise as possible, and that more is superfluous; but it should not be forgotten that the power to arouse the imagination is also a desirable adjunct. Most of what geographers write is intended to be read by others besides a few colleagues whose initial interest in a subject is so intense that their imaginations would be fired by almost any exposition, however inartistic. Even if a geographer is not writing for the general reader, whoever that may be, he should bear in mind the possibility that his work might be used in stimulating the interest of undergraduate and graduate students in his pet subject—surely a desirable end. Hence, if he wish his writing and also his teaching to exert their optimum influence, a certain amount of artistry—at least a touch of the aesthetically subjective—must be injected into them.

The third notion is that most geographers lack skill in giving expression to aesthetic sensitivity and hence should refrain from trying to do so. This, of course, is a *non-sequitur*. There is no question but that the majority of geographers possess aesthetic sensitivity in good measure, and skill in expressing it can be developed by them once the need is admitted. A great deal has been written and more said about the nature of geography; far less about the nature of geographers. Could we subject a few representative colleagues to a geographical psychoanalysis, I feel sure that it would often disclose the geographical *libido* as consisting fully as much in aesthetic sensitivity to the impressions of mountain, desert, or city as in an intellectual desire to solve objectively the problems that such environments present. The Sirens, to whom I have alluded, appeal to the artistic and the poetic that lie deep beneath the surface in most of us, for Sirens themselves are artists and poets. Obviously those few who are basically deficient in aesthetic sensitivity—and thereby functionally deaf to the Sirens—will produce lamentable results when they try to express what little they may possess, and it is always preferable to avoid aesthetic subjectivity altogether rather than to give vent to it in misleading, trite, or far-fetched forms. Nor is the technique of expressing it without doing violence either to scientific integrity or to good taste one that can be quickly mastered with the aid of rules and prescriptions, for taste itself is so largely subjective. But that sound geography can be written and taught with artistry has been demonstrated too often in the past to warrant the belief that it should not be attempted.

Thus, with all due respect toward those who may think differently, I do not regard the scientific and the aesthetic either as mutually exclusive or as antagonistic in geography. Repression of the poetic in our imaginative faculties may deprive us of much of the satisfaction that geographical studies could otherwise yield and render our teaching and writing less powerful than they might well be. American geography would grow rather than shrink in stature and esteem were we to give greater scope to the aesthetic operation of our own imaginations, and, when we see sparks of artistry kindling the imaginations of our graduate students and geographical colleagues, were we to resist the temptation to stamp them out.

BORROWED IMAGINATIVE IMPRESSIONS

We are under no compulsion to rely exclusively on our own imagining or to make use solely of its original products. The imaginative perception of others, the feeling for place that many a sensitive traveler has recorded, may be keener and more accurate than ours and may often be borrowed to advantage. In interpreting the landscape of Iceland or of Arabia one might do better to quote here and there from Lord Dufferin or from Doughty than to try to give one's personal impressions. It is a standard practice in the teaching of history to cultivate the student's sense of time and contemporaneity by requiring him to read selected passages from documents written in the periods that he studies. No less valuable in the teaching of regional geography would appear to be the cultivation of the student's sense of place by requiring him to read passages from works in which the feeling for place has been most effectively expressed. Furthermore, even though we may prefer not to borrow directly from others, our own responsiveness to the Sirens' song is rendered more acute by reading the words of those who have also heard it, and the whole tone of our writing and teaching is enriched thereby.

The realm of geography—geography in the sense of all that has been written and depicted and conceived on the subject—consists of a relatively small core area (to borrow Whittlesey's phrase) and a much broader peripheral zone. The core comprises formal studies in geography as such; the periphery includes all of the informal geography contained in non-scientific works—in books of travel, in magazines and newspapers, in many a page of fiction and poetry, and on many a canvas. Although much of this informal geography offers little of value to us, some of it shows an insight deep into the heart of the matters with which we are most closely concerned. I venture to think that, of two geographers equally competent in all other respects, the one the better read in the imaginative passages in English literature dealing with the land of Britain could write the better regional geography of that land.

The peripheral zone also includes another even more informal type of geography; that of the subjective geographical conceptions of the world about them which exist in the minds of countless ordinary folk. In order to estimate what these are, we seldom need to go as far as the sociologists do in making ostensibly "scientific" inquiries into human attitudes. By talking sympathetically with a few intelligent folk on the ground, by consulting the files of local newspapers and other publications, and by a little adept use of intuition we may, under most circumstances, gain all that

is required for our purposes. For example, the farmers of the Great Plains must look with certain sentiments on the massing of thunderheads after a long drought. Why not give life to our regional or climatological studies of the Plains by letting the reader sense this feeling? That it combines a hopeful expectancy of rain with a dread of tornadoes is a reasonable surmise, even though suggested subjectively by the imagination and only partially confirmed by conversations, rather than established rigorously on the basis of comprehensive interviews or questionnaires concerning exactly what the farmers' attitude toward the breaking of a drought may be.

GEOGRAPHY AND HUMAN KNOWLEDGE

I have tried to suggest some legitimate and desirable uses of the imagination in geography. I should now like to call attention to a broad domain that lies open for much more intensive geographical investigation than it has hitherto received.

Human knowledge is generally regarded as a phenomenon of considerable importance on the face of this earth. It may be made the subject of two types of geographical research: we may either study the geography of any or all forms of knowledge or else we may study geographical knowledge from any or all points of view.

The *geography of knowledge* is that aspect of systematic geography which deals potentially with knowledge and belief of all kinds, whether religious, scientific, philosophical, aesthetic, practical, or whatever else. The various forms and manifestations of knowledge are investigated in the light of their distribution and areal relationships, precisely as landforms, cities, languages, or other categories of terrestrial phenomena are investigated in other branches of systematic geography. Human knowledge, of course, is taken into account incidentally in many of these other branches and also in regional geography. Attention, however, is there concentrated on the results that knowledge produces on the face of the earth, rather than on the geographical nature of knowledge itself.

Though closely allied to cultural geography, the geography of knowledge differs from the latter to the extent that knowledge itself differs from culture. Knowledge is more fluid than culture, often spreading rapidly from one culture area to another without fundamentally altering established patterns. The sociologists have developed the sociology of knowledge more consciously and perhaps more systematically than we have developed the geography of knowledge, and would probably regard the latter as merely a part of the former. This need not trouble us, for there are many phases of geography in which we may profit from explorations conducted by others than ourselves.

Though the possibilities of research into the geography of knowledge are attractive, I wish to dwell here and now more particularly upon the second type of investigation, the *study of geographical knowledge*. As there is no accepted term for this field comparable to "musicology" or "historiography" for the study of musical or historical knowledge respectively, I shall yield to the geographer's perennial temptation and coin one. My term is *geosophy*, compounded from *ge* meaning

"earth" and *sophia* meaning "knowledge." Although this suggests theosophy, there is no connection; nor should *geosophy* be confused with *geosophistry* and *geopedantry*, both of which have been known to flourish. Also, lest you misunderstand, I am not trying to introduce any of these terms into the literature of geography.*

Geosophy, to repeat, is the study of geographical knowledge from any or all points of view.† To geography what historiography is to history, it deals with the nature and expression of geographical knowledge both past and present—with what Whittlesey has called "man's sense of [terrestrial] space."†† Thus it extends far beyond the core area of scientific geographical knowledge or of geographical knowledge as otherwise systematized by geographers. Taking into account the whole peripheral realm, it covers the geographical ideas, both true and false, of all manner of people—not only geographers, but farmers and fishermen, business executives and poets, novelists and painters, Bedouins and Hottentots—and for this reason it necessarily has to do in large degree with subjective conceptions. Indeed, even those parts of it that deal with scientific geography must reckon with human desires, motives, and prejudices, for unless I am mistaken, nowhere are geographers more likely to be influenced by the subjective than in their discussions of what scientific geography is and ought to be.

While it is true that subjective ideas may be studied objectively up to a certain point, geosophy certainly is not a field in which one may apply the stricter methods of analysis possible in the physical sciences and physical geography. I doubt, however, that on this account any geographer in his senses would hold geosophy to be either illegitimate or undesirable. Its value both to ourselves and to the others whom we seek to serve requires little defense. Geosophy can provide a background and a perspective indispensable to our work. It can show us where the ways in which we observe and think fit into a larger scheme. By helping us better to understand the relationships of scientific geography to the historical and cultural conditions of which it is a product, it can enable us to become better-rounded scientific geographers, when that is our purpose. Recognition of its function in these respects is implied by the methodological discussions in which many American geographers take delight, and specifically by the emphasis that Sauer, Brown, Whittlesey, and others have placed of late on values to be derived from the history of geography.

There are many possible approaches to the study of geosophy. Let us consider two of these—the cartographic, and the historical approaches.

* I therefore relegate to a footnote the suggestion that the geography of knowledge might be called *sophogeography* on the analogy of biogeography, zoögeography, etc.

† Studies of geographical knowledge from the *geographical* point of view—i.e., in terms of its geographical distribution, areal relationships, etc., as suggested under the heading "Cartographic Geosophy," below—are contributions not only to geosophy but also to the geography of knowledge. This present address is a study in geosophy but not in the geography of knowledge. Works aiming, for example, to interpret the distribution in the United States of illiterates, or of holders of Ph.D.'s, or of persons able to read Russian, would be studies in the geography of knowledge but not in geosophy.

†† See Derwent Whittlesey, "The Horizon of Geography," *Annals Assn. Amer. Geogrs.*, Vol. 35, 1945, pp. 1–38.

CARTOGRAPHIC GEOSOPHY

The cartographic approach to geosophy involves the making of maps that present information about the distribution of geographical knowledge. Obviously, every map tells us something in this regard; a geosophic map is one designed specifically for the purpose.

Such maps might be grouped in two main categories. The first would comprise maps that present facts relating to what is or has been known *about* different areas. By far the most common of these are maps showing areas that have been surveyed and mapped in various ways, for various purposes, and with varying degrees of intensity and accuracy—*cartosophic* maps, in other words, because they depict cartographic knowledge. In this same category, however, would also belong maps of the world as known to the Greeks or Romans, or of the United States as supposedly conceived by Ralph Brown's friend Mr. Keystone in 1810* or, perhaps, by the average contemporary Bostonian.

The second group would comprise maps that reveal facts concerning geographical knowledge, present or past, *in* different areas or at different places. This is an almost completely virgin field for ingenious experimentation. A dot map, for example, showing the distribution of members of the Association of American Geographers and the American Society for Professional Geographers would disclose information of considerable interest regarding the distribution of geographical knowledge in North America, especially if each dot were colored according to the quality and made proportional in size to the quantity of geographical knowledge in the mind of each individual represented.

Whether or not this particular geosophic map would be either feasible or desirable, geosophic maps in general bring out sharply the contrast between the shadows of ignorance and the light of knowledge. *Terrae incognitae* of various forms and degrees stand forth clearly upon them to arouse our curiosity.

HISTORICAL GEOSOPHY, OR THE HISTORY OF GEOGRAPHY

The historical approach to geosophy implies the study of the history of geographical knowledge, or what we customarily call "the history of geography." This subject is usually understood to deal with the record of geographical knowledge as acquired through exploration and field work, and as formalized and made into a discipline, and most of the work that has actually been done in the field has been restricted to the core area of geographical knowledge to the exclusion of its peripheral zone. There is, however, merit in conceiving it more comprehensively. I have already suggested that geographical knowledge of one kind or another is universal among men, and in no sense a monopoly of geographers. All persons know some geography, and I venture to think that many of the animals do, also.

However it may be with the animals, such knowledge is acquired in the first instance through observations of many kinds—from the stone-age man's view of

* See Ralph H. Brown, "Mirror for Americans: Likeness of the Eastern Seaboard, 1810," New York, 1943 (*Amer. Geogr. Society Special Publn. No. 27*).

distant ranges to the precise geodetic measurements of today aided by the use of electronic devices. Its acquisition, in turn, is conditioned by the complex interplay of cultural and psychological factors. The data with which it deals fall within the scope of each and every one of the natural sciences, the social studies, and the humanities. Its conceptions range from the purely personal, subjective impressions of a farmer or a hunter, to those gained by rigorous mathematical calculations and highly refined statistical correlations, and find expression not only in scientific forms but throughout literature and art. Indeed, nearly every important activity in which man engages, from hoeing a field, or writing a book, or conducting a business, to spreading a gospel or waging a war, is to some extent affected by the geographical knowledge at his disposal. If, therefore, the history of geography be conceived as potentially embracing all of the geographical knowledge of the past in its various relationships of cause and effect, it is an immense subject indeed. It is, however, no more immense than certain subjects of which the teaching is being promoted today—notably the history of science or of the humanities in general, or "contemporary civilization"—and has, besides, one advantage over these, in that it ties together with a unifying thread—that of geography—a record of wide and representative segments of human enterprise, thought, emotion, and techniques. For this reason, I submit that it is a subject of which the investigation and the teaching offer superb educational and cultural values.

AN ASPIRATION

I shall conclude by expressing an aspiration, quite impractical, no doubt, and not to be taken too literally. My aspiration is that there might one day be established in some of our universities or colleges chairs of geosophy and the geography of knowledge. The purpose would be to increase the effectiveness of geographical research and education by broadening their scope. One school of thought has held that the effectiveness of geography can be increased only by limiting its scope, but this school would seem to confuse the effectiveness of geography as a discipline or profession with that of the individual geographer or existing university department. The more general tendency today is to stress the need of better linkage between geography and other subjects, notably ecology, soil science, agricultural and industrial economics, and cultural anthropology, and not a few regret the loosening of ties with geology and the various branches of geophysics. To the desirability of establishing and reëstablishing such contacts, I would add, as no less desirable, the reëstablishment of closer connections with history and the humanities.

In the periphery that lies outside the core area of scientific geography there are alluring *terrae incognitae*. If we ourselves do not personally feel equipped or competent to conduct excursions into them, should we exclude them from the scope of our sympathies? Although most of us are committed to the advancement of scientific geography along straight and narrow paths and would do well not to deviate too far from the directions in which they lead, we may at least extend our interest and encouragement to those who daringly strike out upon other routes. There is something to be said for considering scholarship, as distinguished from science

alone, as our métier. All science should be scholarly, but not all scholarship can be rigorously scientific. Scholarship, moreover, embraces not only the natural sciences and social studies but also the humanities—the arts and letters—inquiring no less into the world of subjective experience and imaginative expression than into that of external reality. The *terrae incognitae* of the periphery contain fertile ground awaiting cultivation with the tools and in the spirit of the humanities.

The professors whom I have in mind would develop their subjects along different lines according to their tastes. Some might specialize in the geosophy of scientific geography—in its history, its methods, and perhaps in comparative biographical studies of the careers of individual geographers as bearing on the larger progress of geography. Others might concern themselves with geographical conceptions, both scientific and otherwise, as influencing and influenced by particular human activities and motives, or with particular categories of geographical knowledge in relation to the changing tides of doctrine and opinion.

At least one or two should surely devote themselves to what might be called aesthetic geosophy, the study of the expression of geographical conceptions in literature and in art. Literary historians, but few geographers, have followed the Sirens' call into these *terrae incognitae*. Need we leave their exploration wholly to the literary scholars? One function of my hypothetical professors of aesthetic geosophy—though God forbid they be called by such an atrocious title—would be to prevent the oncoming generations of geographers from becoming too thickly encrusted in the prosaic and to render the study of geography more powerful than it would now seem to be in firing the artistic and poetic imaginations of students and public. These professors should be scholars in the humanistic sense—men widely read in the classics of geography and also in general literature and in literary criticism and history. Masters of a style not only clear but restrainedly artistic, their writings might help raise the standards of geographical writing as a whole. Their research and teaching would be directed toward the discovery and the interpretation of geographical truth, belief, and error as they find and have found literary and artistic expression. As long as they did not come to regard themselves as the only true exponents of what geography ought to be, there would be little danger of their exerting an adverse effect upon the advancement and the prestige of scientific geography. They could do much to keep our ears open to the Sirens' song and make our voyaging into geographical unknowns a perennially satisfying venture, for, perhaps, the most fascinating *terrae incognitae* of all are those that lie within the minds and hearts of men.

ABSTRACTS OF PAPERS CONTRIBUTED TO THE PROGRAM OF THE FORTY-THIRD ANNUAL MEETING, HELD IN COLUMBUS, OHIO

DECEMBER 28, 29, AND 30, 1946

CARTOGRAPHY, MAP INFORMATION, AND PLACE NAMES

MEREDITH F. BURRILL—*Principles Underlying Domestic Place-Name Decisions.*

The principles governing domestic geographical name decisions that were laid down in 1890 have been followed with little modification, since they were based on observations of evolutionary trends and of the practical functioning of toponyms in identifying and facilitating reference to the entities named.

The general soundness of the early principles does not seem to have been matched in the methods of determining local usage and of establishing the use of decisions. Few decisions should have to be reversed if local usage is determined accurately by specially trained personnel using the most up-to-date techniques, and if the local people are shown in advance the logic and convenience of proposed decisions.

All the names in a region should be studied at the same time, for only then do the characteristics of the region's nomenclature show up.

WILLIAM E. DAVIES (Introduced by Edward B. Espenshade, Jr.)—*Weaknesses of Current Cartographic Practices.*

The renaissance of cartography in America and the special emphasis placed upon it during the war years have revealed many fundamental weaknesses in the methods now in use. Most of these deficiencies are attributable to the lack of adequately trained personnel, in turn reflected in problems arising in techniques and operations.

Outside of topographic surveys, the sources of information are seldom adequate for utilization on maps. Though itself demanding of detailed accuracy, cartography is dependent for information upon such sciences as geology and geography, in themselves not exact sciences.

Equipment and mechanical processes developed during the war enable photographing by aerial means of vast areas and the utilization in map-making of data so recorded. However, the great disparity between the capacity to take photographs and to utilize them makes it imperative that plans be devised for the exploitation of all photography available. One critical element in the utilization of aerial photography is photo-interpretation. Current techniques practiced in this field are scarcely adequate for conditions found in the United States, but fall far short of providing a proper basis for interpretation of detail characteristic of other areas.

While map symbolization, design, and expression have shown little progress in the last generation, the amount of data to be delineated has increased enormously. With the growing tendency to incorporate terrain classification data on topographic maps, current design and symbolization become inadequate and restrictive. In addition, the trend toward mass production of maps has necessitated an extreme of standardization, which, now being stereotyped, threatens to retard further progress in cartography.

Place-name problems have received considerable attention during the war. However, in many areas where a non-romanic alphabet is used, the place names, when transliterated into English, become a far cry from the original sound and are of value only to a skilled linguist.

The work of a cartographer not affiliated with a large specialized mapping organization is hampered by the lack of library facilities, a deficiency now being corrected to some extent by governmental action.

The problem of correcting and maintaining up-to-date map information has always plagued the cartographer, and with the current rapid economic development of most nations, the problem becomes more acute. In the United States one of the most serious failings of official mapping institutions is their inability to provide for periodic revision of maps, a condition which has restricted the utilization of published surveys. Paralleling the problem of map correction is that of map distribution and sales. The policies now in effect in the United States are antiquated and hopelessly inadequate, prohibiting the maximum sale of maps, which in turn limits the profit to be derived.

CARL H. MAPES (Introduced by Edward B. Espenshade, Jr.)—*A Method of Constructing Azimuthal Air Charts with any Selected Place at the Center.*

With the aid of a globe equipped with instruments for measuring great-circle directions and distances (Exhibit A), and a circular plotting chart for representing these measurements upon a plane surface (Exhibit B), it is possible to construct various types of azimuthal air charts for demonstrations and interpretations of global locational relationships.

For instance, suppose one wishes to examine the global position of Columbus in relation to the major cities or strategic air centers of the world. The globe is adjusted so that the city of Columbus is centered between the movable great-circle measuring blades, with the North Pole in line with 0 degrees on the fixed horizon ring. By raising one of the blades to any desired city, such as London, it is possible to determine the azimuth or great circle direction of that city from Columbus from the scale in degrees on the fixed horizon ring, and to determine the great-circle distance between the two cities from the scale in statute miles on the movable blade. The process is repeated for other cities or air centers and a table of great-circle directions and distances from Columbus to these centers is thus obtained.

The next step is to locate each of the selected air centers on the plotting chart by reference to the circular azimuthal scale for its great-circle direction from Columbus

at the center, and by measurement along that great circle for its distance. If the scale of distances used on the plotting chart is the same as the scale of the globe, the result obtained is an azimuthal equidistant air chart of the world centered upon the city of Columbus (Exhibit C). Such a chart enables one to demonstrate and interpret some of the significant global relationships of this city in the air-age world.

Although the azimuthal equidistant air chart is probably the most useful type for geographical interpretation and the simplest to construct, it is also possible to develop gnomonic and stereographic charts if the need arises. For these variations of the azimuthal type of projection, the plotting chart is used as a means of developing graphically the scales of distances that are required (Exhibit D). A gnomonic chart with Columbus at the center is restricted to an area with a radius of from 60 to 70 degrees, but, by virtue of its properties as a projection, all straight lines are segments of great circles.

It is believed that the methods hereby described for the graphic construction of azimuthal air charts will be of interest and value both to the student of cartography, and to the geographer seeking media of expression in geographic interpretation.

ELEANOR M. ROWELL (Introduced by Edward B. Espenshade, Jr.)—*Present Status of the International Map of the World at 1: 1,000,000.*

Like all topographic mapping, the compilation of maps on the scale of 1: 1,000,000 was greatly accelerated during the war years. Some of these sheets compare favorably with the specifications of the International Map but most of them are at variance with its standards.

Since the demand is great for maps at this scale and since sheets which conform strictly to international map standards are not available over large areas of the world, an index has been prepared which shows a total coverage of approximately 80 per cent of the land areas of the world covered by 1: 1,000,000 maps compiled on International Map sheet lines. This index is in startling contrast to the one published by the Central Bureau in 1938.

Important as coverage is, other factors are as significant to the user. In general, maps appearing on the first index but not on the second may vary from true International Maps in one or all of the following significant features: in projection, in the method of depicting relief, in language and place name treatment, in symbolization and in the treatment of marginal data.

These variations considerably lessen but do not nullify the usefulness of these maps. They do, however, limit their efficient use to all but those fortunate users who are already familiar with the terrain, language, literature, and culture of the areas mapped. Once aware of these limitations, users will find this series to be an extremely useful reference for geographic studies of many kinds.

LEONARD S. WILSON—*Report of the Committee on Map Classification.*

During the past year, the members of the Committee had the opportunity to examine numerous methods of cataloging, processing and filing maps. Among the techniques examined were the following: Division of Maps, Library of Congress;

Division of Geography and Cartography, Department of State; Army Map Service, Corps of Engineers; Map Division, Office of Strategic Services; American Geographical Society; Geographical Section, General Staff (British); Foreign Office, NSDAP, Berlin; Justes Perthes, Gotha, Germany; University of Vienna; Bibliotheque Royale, Bruxelles; Institute Geographie National, Paris; Royal Geographical Society, London; Bibliotheque National, Paris.

Two radically different methods of cataloging were encountered during the study. These included the conformal methods in use in the majority of collections and most easily described as being similar to, if not identical with, the methods used in the processing of books; and non-conformal techniques in use at various collections, notably the Army Map Service. The Army Map system comprises a series of cards prepared through the use of machine records methods. It serves the highly specialized needs of the Army Map Service but is not applicable to more generalized libraries which are open to the public.

The Committee believes that a more unified and standardized method of processing maps is desirable and practical. Such a method could, if adopted by any library, be usable in the preparation of the data which eventually appear on the final cataloging cards.

In addition to examining the above listed material, the Committee, through its Washington members, considered a request for evaluation and recommendation of the map cataloging plans of the Division of Maps, Library of Congress. It made certain recommendations to the Division of Maps prior to the issuance of the Cataloging Manual prepared by the Library of Congress.

CLIMATOLOGY

CHARLES F. BROOKS—*Primary Climatological Stations.*

By a primary climatological station is meant one at which all the climatological elements are observed, (1) in homogeneous fashion, (2) with standard instruments that are frequently checked, (3) during a period of at least three decades, and (4) in an environment (of any type) that does not change over the years.

The value of such a station is that it will (1) establish the climate of a place, (2) determine the short and long period changes, and, apparently still more important, (3) aid in determining the climate of any other spot in the general vicinity, for which a short or non-homogeneous record may be available.

The elements that should be observed are not only those of standard practice but also what may be called the "weather temperature" and "general surface temperature." The weather temperature is what a standing person feels; the general surface temperature is what a reclining person feels. Both are the resultant of radiation, air temperature, moisture, wind, and, in addition for a man lying on the ground, the ground temperature and wetness. These physiological expressions of the weather, and, in their ensemble, of the climate, may be directly measured by taking the temperature of a black dummy with a porous surface.

The number of stations required seems to be on the order of 100 for an area equal to that of continental United States. Seventy-five of these would provide one station per 400 square miles, i.e., the stations would be 200 miles apart. The other 25 would be needed to take care of the smaller areas of climate not homogeneous with the larger, chiefly in the mountainous and coastal regions. A careful study of the climates of the country to determine the limits of homogeneous climatic areas is needed. Each such area should have perhaps two primary stations, on the average. Other regular stations might well be abandoned, and sufficient economy effected thereby to offset, if not to exceed, the expense of expanding the chosen ones.

The procedure in using primary stations in determining the local climates in the vicinity is essentially to compare the record of a secondary station with the simultaneous portion of the record of the primary to determine a ratio (precipitation) or difference (temperature) that can be applied to the full record at the primary station to arrive to the probable climate of the secondary. A primary station with one or more mobile secondaries can soon cover the range of climates in its region, even without observing in all parts, for each topographic type of location, such as marshy flat, will have much the same climate everywhere it is found. A climatic zoning map of Worcester, Mass., was made on this basis.

JOHN B. LEIGHLY—*Profiles of Temperature Normal to Coast Lines.*

Discussions of the effect of proximity to the sea on air temperature usually treat daily and annual ranges separately. But where maximum and minimum temperatures are recorded daily and the results published as monthly means, as in the United States, the published data define simultaneously the daily ranges in the several months and the pendulation of temperature through the year. Profiles of averages of extreme and mean temperatures may be drawn from the observations made at series of stations selected to show transitions inland from coasts. These profiles give an insight into local and regional differences in the transition from marine to continental temperature régimes.

The general form of these profiles under various conditions can be deduced. The most important variables are the relative temperatures of the neighboring surfaces of land and water and the direction of wind across the coast line. Averages comprise momentary observations made under a wide variety of these conditions, but profiles drawn from them permit recognition of the conditions that are predominant. The coast of Texas, for example, provides profiles that reflect a small difference in mean temperature of the surfaces of land and sea, but near the coast a strong influence of the small daily range in air temperature over the Gulf. A profile across the Lower Peninsula of Michigan, terminated at both ends by coast lines, shows an effect, particularly conspicuous in winter, of the predominance of winds from the west. A profile drawn inland from the coast of Maine shows little effect of the sea on the daily range of temperature, but a conspicuous maritime influence on the transition of both maximum and minimum temperatures in winter, when the surface of the land is much colder than that of the neighboring sea.

C. W. THORNTHWAITE—*An Approach Toward a Rational Classification of Climate.*

The various climatic elements, such as temperature and precipitation, when plotted on maps grade regularly from high to low values except where gradients are steepened on mountain slopes or sea coasts. Temperature and rainfall regions are delineated by arbitrarily selected isotherms and isohyetals. Köppen made a significant advance when he undertook, first to identify the climatic regions and locate their boundaries from studies of the distribution of vegetation, and then to select numerical climatic values for their boundaries. This approach, although an improvement, is still empirical.

In the present study I have compared the water supply (precipitation) with the water need (potential evapotranspiration—the water that would evaporate and transpire if it were available). When precipitation exceeds potential evapotranspiration the climate is moist. Where precipitation is less than potential evapotranspiration the climate is dry. In most places there is too much precipitation in one season and too little in another. The resulting water surpluses and water deficiencies may be combined to provide a moisture index. With it we have at least the beginning of a rational climatic classification.

STEPHEN S. VISHER—*Precipitation Seasons and Contrasts in United States.*

Data which permit a more adequate recognition and delimitation of precipitation seasons in the United States have recently become available. Maps showing these regions and the dates of the beginning and ending of the various seasons are given. Other maps show the frequency and wetness of relatively wet seasons and the frequency and dryness of relatively dry seasons. All of these maps are to appear in the *Geographical Review.*

In brief, conspicuous seasonal contrasts occur as to the total amount of precipitation, as to the intensity of rainfall, as to snowfall and as to hail. A few consequences are: Florida's relatively dry winters aid the winter tourist industry; New Mexico's relatively rainy mid-summer favored the development in that area of relatively advanced early Indian cultures based on corn. In the north-central Plains region, the dry winters favor stock raising. The almost rainless summer of much of California is conducive to the drying of fruit and encourages irrigation. The Pacific Forest is of conifers, with their quick vegetative growth in spring, rather than of deciduous trees, with their main growth in summer, which is relatively dry there. Excessive rainfalls are relatively numerous in the South, augmenting soil erosion in a region where several other conditions induce erosion. Hail is relatively rare in summer in the chief fruit growing areas.

The effects of wet seasons vary with their degree of wetness and region of occurrence. They are welcome in dry regions, usually beneficial in sub-humid ones but commonly harmful in rainy regions. Because of the harm caused by floods, greatly augmented soil erosion and, in normally dry regions, the unwise land use encouraged by exceptionally wet seasons, it is probable that such seasons do more total harm than good.

Dry seasons cause damage in many ways, including the increasing of forest fires and other fires, and dust storms, and the decreasing of yields and animal growth. Their unfavorable influence on water supplies including irrigation and water power is well recognized. Relatively dry seasons are generally unwelcome except in wet lands, but the damage they cause is probably less serious than that caused by relatively wet seasons.

ECONOMIC AND REGIONAL GEOGRAPHY: THE AMERICAS

ALBERT S. CARLSON—*Location Advertising, Planning, and Federal Subsidy as Plant Locational Factors.*

To the conditions determining location or the industrialization of an area usually discussed in Economic Geography, must now be added three increasingly important factors, namely, (1) location advertising, (2) planning, and (3) federal subsidy.

Location advertising designed to attact management to locate their proposed plant in a given city, state, or region has boomed to great proportions in recent months. It does result in some factories being built in areas in which management would not have placed them except for the advertisement; it hastens industrialization in some sections, slows it in others. Such publicity is more effective in securing concerns which are labor-market oriented and whose product is high in value and small in bulk, than those needing raw material or fuel and whose product is costly to transport. Is it wise for an existing or potential manufacturing area to refrain from advertising when other areas are doing it?

Planning-agencies at the state, regional, and local level are influencing the industrial pattern of the nation by the use of economic geographic analysis and regional geographic presentations in the form of maps, pictures and graphs and friendly services in such a way that business management has found them of great help in locating and building their businesses. These agencies are particularly influential in two ways. First, they provide raw material and market data which otherwise would be unknown to many enterprisers. Second, and perhaps more important, they are evidence of friendliness to industry in their area. The friendly region or town will attract a factory more readily than will those which are not congenial to industry, as the cost of transportation decreases and its speed increases and as regional differences in power and labor costs diminish.

The recent McCarran Resolution and the Baily Bill, S-1385, are designed to build up industry in western and southern states where it has not developed in the past. These bills assume that an area with a large percentage of wage earners in industry should not be encouraged to increase industrial production. They reason that areas with no industrial production should possess more. Such an objective is obviously a challenge to the concept of locating industry at the lowest cost-point with as little political interference as possible.

The past efficiency of American industry cannot continue in the future unless these three increasingly important plant location factors are studied in terms of the economic-geographic conditions in specific industries and viewed in the light of the whole regional geographic setting in which the given industry is to be placed.

LOYAL DURAND, JR.—*Recent Market Orientations of the American Dairy Region.*

The American Dairy Region has been drawn on increasingly during the past decade for milk and cream supplies for the United States. As the one major region of surplus milk production in the United States it has now become a major supplier of fluid milk and cream to distant markets; in this respect it has assumed a position parallel to that of the Cotton Belt in surplus cotton production, or the Corn Belt in surplus corn and meat production.

The pattern prior to World War II, familiar to geographers and economists, was: (1) the surplus milk production of the dairy region was turned into manufactural products (cheese, butter, etc.), and (2) each American city outside of the dairy region has a circular surrounding area about it, engaged in fluid milk production for the city market. An unusual demand for milk and cream, engendered by a variety of circumstances, made the market too large for the existing local milk sheds of the second type. The result has been that cities all over the eastern half of the United States have had to draw on fluid milk and cream supplies from the American Dairy Region of the Short Summer Climate. Fresh milk, fresh cream, and plastic cream now move hundreds of miles to distant markets. The statement that "bulky, perishable products, such as milk and cream, are produced close to the market" is no longer strictly applicable.

Wisconsin, as the leading center of the Dairy Region, illustrates the War-born changes in market orientation. As of August, 1946, fluid milk and cream, and plastic cream, were being shipped daily to such distant points as Boston, New York, Philadelphia, Bridgeport and Hartford, Conn., Pottsville, Pa., Binghamton, N. Y., Paterson and Newark, N. J., Harrisburg, Pa., Washington, D. C., Knoxville, Chattanooga, and Nashville, Tenn., Asheville, N. C., Atlanta, Ga., Miami, Fla., New Orleans and Alexandria, La., Houston, Dallas, and Port Arthur, Tex., and to cities in Virginia, Alabama, Mississippi, Delaware, Ohio and Kansas. Northwestern Wisconsin, 350 miles northwest of Chicago and only 100 to 150 miles south of Lake Superior, and western Wisconsin were the chief source regions. One dairy plant, just over 100 miles south of Lake Superior, was shipping to Miami, Florida, an airline distance of over 1500 miles.

The dairy manufactures of many sections of the American Dairy Region have been war casualties. Brick cheese production alone in the state declined 47.6% between 1944 and 1945, though total cheese production maintained itself as a result of increased milk production; marked regional shifts occurred, however. Price increases locally were the only method which enabled many Wisconsin cities to maintain their local milk supplies.

JOHN H. GARLAND (Introduced by Charles C. Colby)—*Problems of the Grand Prairie of Illinois.*

This paper is essentially a progress report of a long-range undertaking designed to satisfy a dual objective: (1) a detailed geographic investigation of a limited area, and (2) the development and refinement of collegiate courses of instruction based

upon that investigation. The program, which was initiated several years ago, is concerned with the state of Illinois.

The initial stages of development were concerned with areal patterns. The first dealt with settlements, the second developed a system of homogeneous areas of varying magnitudes, and the third checked the system of areal patterns by a field traverse.

The first area to be selected for detailed investigation is the Grand Prairie which is a section or subordinate portion of the Eastern district of the Central division of Illinois as designated by the earlier stages of development. The Grand Prairie extends from the Indiana state line to the Shelbyville moraine on the south, to the Middle Illinois valley on the west, and the Upper Illinois valley and the Marseilles moraine on the north.

The Grand Prairie is an area of most recent glaciation. A series of low crescentic recessional moraines and the shallow forested valleys of eight streams that rise on the flanks of the Bloomington moraine and flow out of the Grand Prairie in all directions are the only physical interruptions to continuous flat black fields planted to corn and soya beans. This is a land of large tenant-operated, mechanized, cash grain farms; the most profitable type of agriculture for the least amount of human effort, the most destructive to soil fertility, and therefore the agricultural utilization of the newest and richest land. Farms have increased in size and tenant operators have increased in number as a highly motorized mechanization has developed along with greatly increased yields attendant upon hybrid seed development.

Little villages consisting at best of the necessary service features of a commercial grain section are spaced approximately at five-mile intervals along the numerous railroads which crisscross the Grand Prairie focusing on the larger towns in a series of overlapping radials. Most of the large towns are county seats of the score of counties included in the section, and aside from their political and commercial functions also have a limited industrial structure that has the possibilities of further development. The manufactures of these agricultural service centers are of three types: community service, localized, and specialized.

The detailed investigations are being carried forward on the basis of problems. It is the type of thing that must be lived with for a long time, the solutions growing out of a wealth of intimate observations rather than of statistics. Problems under investigation and to be investigated include: (1) surface and underground drainage, and water supply—basic problems in the Grand Prairie, (2) soil depletion and its correction, (3) Grand Prairie farmsteads and their significance, (4) minor agricultural activities within a commercial economy, (5) Grand Prairie villages and their changing functions, (6) industrial functions of the large towns, and (7) changing occupance of the Grand Prairie.

HAROLD A. HOFFMEISTER—*The Colorado–Big Thompson River Water Diversion Project.*

The Colorado–Big Thompson River Project will divert yearly 310,000 acre-feet of surplus water from the Colorado River to irrigate approximately 615,000 acres of

land in northeastern Colorado, where every reasonable local source of supplemental water has been exhausted.

The storage of Colorado River water will be made in Granby Reservoir, from which it will be pumped into Shadow Mountain Lake, connecting with Grand Lake. Diversion will be made through a tunnel bored 13 miles through the continental divide near Long's Peak. The water will flow down the Big Thompson River, where it will be stored in three reservoirs located west of Fort Collins. From these reservoirs the water will empty into the Cache la Poudre, Big and Little Thompson rivers, and St. Vrain Creek; some of it will carry far down the South Platte River. Diversion dams and canals will conduct the water onto the irrigated lands of six Colorado counties. Five power plants, four on the Big Thompson and one at Green Mountain, will generate an estimated 360 million Kw-hrs. of power, above operational needs.

The highly productive irrigated lands of northeastern Colorado are underdeveloped, and frequent crop losses result from the serious shortage of water. The average shortage has been 26 per cent below optimum, and in 1934 there was a shortage of 49 per cent. As a result, the average annual loss in crop values alone would average $4,700,000, and indirect losses would average over $5,000,000.

Users of water on the western slope view with alarm the increasing diversion of water to the eastern slope. To allay these fears, the Bureau of Reclamation has assured them of adequate water for future needs. To compensate for the diversion of water on this project, the Green Mountain Reservoir has been constructed on the Blue River to store flood water to supplement the run-off in the low stage of the Colorado River. Every effort is being made to preserve and improve the agricultural, power, livestock, and recreational interests of the western slope.

The entire project is estimated at present to cost about $110,000,000, but with increased cost of material and labor the final cost will probably reach more than $170,000,000. Although some surplus water can be diverted to the eastern slope immediately, the whole project probably will not be completed until 1952.

A tentative method of financing the project has been proposed whereby a "Water Conservancy District" will be created and empowered to levy (1) a general tax on all property in the district to pay for the indirect benefits of the project, (2) a special tax on lands receiving direct water, on the basis of $2 per acre foot, and (3) a special undetermined tax on lands benefiting from return water flow. These taxes, plus the revenue from the sale of electricity, are supposed to repay the cost of the project within from forty to fifty years.

TIM K. KELLEY (Introduced by H. A. Hoffmeister)—*A Program for Stabilizing the Fishery of Washington.*

The fisheries of Washington constitute an important part of the state's wealth. The 1942 production, valued at $16,000,000, places Washington third to California and Massachusetts in value of product landed. Value added by processing amounted to additional millions, which together with the fleet, provided work for 9,543 employees. This monetary and employment value, plus food properties and recreational appeal, make the fisheries worth whatever effort is necessary to maintain a

high productive level. Like other forms of natural wealth, this inheritance has been misused.

The fisheries of the United States are perhaps the most poorly managed of our natural resources. This, however, is not true of Washington, for State, Federal, and International agencies have united to develop a program of conservation second only to that of California. Each fishery has its own methods and problems, many of which are being solved, either within the industry or through investigational work by one of the conservational agencies. It may well be, however, that there is a place for a comprehensive overall program which can serve as a future objective. A plan for such a program, which would tend to make the fisheries one of the state's permanent assets, follows:

1. *An expanded educational program*

   Because many citizens are unaware of the necessity for rigorous regulation, the educational program should be expanded. This could be done through the public schools, and by use of the press and radio.

2. *Increased biological and technological research*

   Such agencies exist and have done yeoman work. Increased appropriations are necessary in order that proper legislation, based on sufficient scientific information, may be enacted.

3. *Recognition of conflict-of-interests principle*

   Hundreds of conflicts between two or more industries, each claiming precedence, have occurred. It is necessary that a fair evaluation be made in case of rival industries so that neither suffers irreparable damage.

4. *Recognition of the need for regulation*

   Restrictions which will enable the industry to attain a sustained yield at a profitable level should be applied with due regard to both fisherman and public.

5. *Artificial propagation, when feasible*

   Hatcheries can go far toward repairing damage suffered by the anadromous species. Further expansion is desirable.

6. *International cooperation and regulation*

   Measures successful with salmon and halibut, where Washington is a pioneer in the field, should be followed by additional international legislation.

7. *Interstate cooperation and regulation*

   The Columbia River should be under a uniform authority regardless of state boundaries.

8. *Jurisdiction over the continental shelf*

   A twelve-mile limit is untenable. National jurisdiction over the waters of the continental shelf is the only feasible policy.

9. *Revision of Northwest Indian treaties*

   These treaties need careful revision to insure a fair allocation and an ample escapement.

10. *Marketing of lesser known fish*

    Methods should be employed to widen the sale of relatively little-used varieties.

WALTER M. KOLLMORGEN—*Land Reclamation in the Arkansas–Red River Segment of the Alluvial Valley of the Lower Mississippi River.*

The disappearance of our agricultural frontiers has increased interest in land development through reclamation. Up to now the work of the Bureau of Reclamation has been limited to the more or less arid 17 western states. At present much promotional activity is in progress to expand drastically the agency's area of operation, and undeveloped lands in the lower Mississippi Valley are usually referred to as an excellent site for expanded land reclamation.

State and local interests have long promoted land reclamation in the alluvial valley, partly by expanding flood-control activities, which have now been shifted to a Federal responsibility, but also by individual and district drainage activities, which have been only partly successful. In December 1944, the U. S. Army Engineers were for the first time authorized to combine major drainage work with flood control, and important drainage projects have been authorized. At present local sentiment is divided regarding land reclamation by the Bureau of Reclamation *versus* reclamation by the Army Engineers. The Bureau can still sponsor more complex land development programs than the Army Engineers, but must insist on limiting farms to family-sized units. This limitation poses a special problem in an area dominated largely by plantation interests.

Land reclamation in the alluvial valley of the lower Mississippi River was begun by the first French settlers near the mouth of the stream as early as 1718. In the Arkansas–Red River segment developments are more than 100 years old. At first these efforts were private, but they became a state responsibility with the Swampland Grants in the late 1850's and early 1860's. While these grants envisioned both flood control and drainage, they accomplished neither. Although levees were built by the states, they were ineffective, and almost nothing was done to improve drainage.

After 1900, numerous drainage districts were organized in the Arkansas–Red River segment to improve drainage conditions, but most of them went bankrupt and little effective drainage was provided. The Mississippi flood of 1927 and the agricultural depression that followed ended local drainage activities almost completely. Even in the absence of these disasters, local efforts at drainage were doomed to fail, partly because of the local and fragmentary approach to the problem. Although many of the hill farmers adjacent to the alluvial valley have long been in need of an expanded economic base, large reclamation projects in the valley, to be effective, need to be more complex and expensive than is generally realized. Moreover, exaggerated notions are widespread regarding the value and productivity of much of this alluvial land.

BEN F. LEMERT (Introduced by Chauncy D. Harris)—*Economic Conditions in Mexico.*

Since 1930, and especially since 1934, economic conditions in Mexico have been changing. Although 76% of the people depend upon agriculture for a living, the principal sources of wealth in the republic have been its mines, oil fields, and a recent

rapidly developing manufacturing industry. Mexico's future prosperity depends upon greater volume and variety of crops, increase in improved and newly developed cultivable areas, and expansion of industrial production of low-priced consumer goods based on materials from its fields and mines. All such development depends upon efficient communication.

The economic security of the nation rests upon workers engaged in agriculture. Improvement in their economic condition builds up buying power to support industrialization, which, in turn, pays more for greater volume of raw materials further aiding the agricultural workers.

During the past 15 years a favorable government, especially from the time of the administration of Cárdenas, has promoted agricultural credit, irrigation works, rural education, and division of lands. By September 1939, more than 61,000,000 acres had been distributed, benefiting more than 2,000,000 persons directly. Today men are clearing land at nine and ten thousand feet on the slopes of Ixtaccihuatl, digging wells, and banking fields between Saltillo and Torreón where corn, wheat, fruit, and vegetables are already growing in a desert. The Pan-American highway appears from a plane to be graded to the Guatemalan border, and trucks are operating as far as Juchitán. The effect of highway transport on agricultural development is great, due to time saved in marketing, widened market range, and spread of knowledge. There is reason to believe in continued stable government because increased numbers of small land-holders support a government that protects them.

In addition to internal activity, Mexico's progress has been speeded up during the last five years by external events. The recent war caused a rise in economic activity resulting in sharp advances in cost of living and the level of wages and salaries. Large exports of raw materials, foodstuffs, and manufactures meant ownership of more gold and foreign credits. Bidding for scarce goods formerly imported and widely used, raised prices. Shortage of labor due to loss of that which went to the United States caused higher wages. Money sent home to relatives increased the amount held by individuals. Lack of revenue from imports resulted in higher internal taxes. Increased bank receipts stimulated credit expansion. All this increased the money in circulation and diminished its purchasing power.

Survival of many new industries will depend upon tariff protection and import licenses, already decided upon by the government to preserve those industries contributing most to the convenience and well-being of the people.

HOYT LEMONS—*Observations on Summer Conditions in Arctic North America.*

During the summer of 1946, the writer had the unusual opportunity of observing and studying vast stretches of Arctic North America and Greenland from the air, from the sea, and on land, while accompanying Naval operation Nanook as official geographer and observer for the Research and Development Branch of the Army Quartermaster Corps. The expedition took in the west coast of Greenland to 82° N., where it was stopped by pack ice, the east and south-east coast of Ellesmere Island, and Devon Island, Bylot Island, and Baffin Islands. In addition, long flights were

made over Peary Land and Grant Land on the coast of the Arctic Ocean, Melville Island, and elsewhere. Lengthy stops were made at Thule and Etah in Greenland, at Tay Bay on Bylot Island, and at Dundas Harbor on Devon Island.

Environmental conditions during the summer season are of interest to the Quartermaster Corps. The areas observed were rugged and glaciated, with ice-capped interiors. The waters were surprisingly free of ice. In late August pack ice was encountered in Melville Sound and in upper Kane Basin. The weather was cool, the temperature being in the high thirties and low forties most of the time, with little diurnal variation. Although the sun circled the sky constantly, the percentage of total possible sunshine actually received was small due to the frequency of fog, mist, and cloud. Winds were very changeable. A 58-knot wind was experienced in North Star Bay at Thule. Plant and animal life was profuse in the waters and also on the coasts in many spots. Dozens of species of plants and birds were identified as far north as Kane Basin, and ecological conditions were intensely interesting because of conditions of drainage, soil, insolation, glaciation, etc. Fox, Arctic hare, auks, sea gulls, and ptarmigans were common on land. Seal, walrus, and polar bear were observed at the edge of the ice pack.

Polar Eskimos were found as far north as Thule in Greenland and on Devon and Bylot Islands. The Danes apparently have pursued a highly enlightened policy with the Eskimos and Greenlanders in Greenland.

HAROLD M. MAYER (Introduced by Charles C. Colby)—*Procedure in Preparation of an Industrial "Sketch Plan" for Metropolitan Philadelphia.*

To provide a framework for improvement and redevelopment recommendations, the Philadelphia City Planning Commission is preparing a "sketch plan" of Metropolitan Philadelphia of a generation hence.

The initial stages of the sketch plan procedure consisted of study of existing patterns and consideration of preliminary future patterns of each land use in order of flexibility of the site requirements for the use. The port, industrial, and railroad patterns were considered first. The port, because necessarily located on navigable water, was considered most inflexible in terms of site conditions. A preliminary pattern of the future port, subject to modification as other elements are considered, was evolved, and areas to be included within the port were determined. Industrial and railroad patterns were studied together because of close relationships in location and function. Industries were listed by general type in order of flexibility of site requirements. Thus the petroleum industry, requiring extensive areas in proportion to employment and generally needing deep water frontage, was studied first, followed by other industries requiring deep water, then those requiring railroad sidings, and finally, those not needing railroad locations. For each type of industry, trends in type of plant and of area requirements per employee and per unit of production were studied. Economic studies indicate broadly the probable extent of future development of each major type of industry. With study of technological requirements, this indicated the approximate amount of area needed. Detailed study was made of

local industrial districts to determine the extent to which each meets, or can be redeveloped or expanded to meet, anticipated requirements.

Studies of population trends and labor force indicated the amount of anticipated employment. The future preliminary pattern of industrial areas was tested in the light of these trends. A rough determination was made of the amount of land probably required for future industrial activity in each section of the metropolitan area. At the same time, areas physically suitable for industrial development were determined, and judgment made of the probable extent of industrial development in each area, as well as railroad and other facilities needed to serve the area.

With future patterns of port and railroad as well as industrial areas and employment roughly determined, the next steps are to (1) determine the general future residential pattern with relation to centers of industrial employment, and in desirable densities and physical relationships, (2) determine location of future commercial centers, (3) lay out routes for future highways and transit, and (4) determine locations and sizes of community facilities and services.

With that framework, evaluation of specific projects can be made with some assurance that trends in the evolving urban pattern will not soon make new land uses, buildings, or facilities obsolete in location, function, or scale.

E. WILLARD MILLER—*Some Aspects of the Mineral Self-Sufficiency of the United States.*

The United States has long been the leading producer and consumer of minerals in the world. From 1880 to 1944 the value of the annual production of the mining industry increased 18-fold from $367,000,000 to $8,452,000,000. The strength of this country in war and its high standard of living in peace are based primarily on the development of the mineral industries. However, the United States has consumed its high-grade minerals faster than any other country, particularly so during World War II. Consequently, many conflicting viewpoints as to our remaining mineral reserves have been presented. Some of these are: (1) our minerals, for all practical purposes, are already exhausted; (2) large reserves are still to be discovered by the use of new methods; and, (3) our present reserves are sufficient for all demands.

It is, therefore, appropriate to determine the self-sufficiency of the United States in its mineral needs. In a survey of domestic production in proportion to total consumption from 1930 to 1945 the following trends were obtained. Minerals with 100 per cent self-sufficiency included petroleum, coal, iron, molybdenum, cadmium, aluminum, magnesium, potash, phosphate, salt, and sulphur. Minerals with a self-sufficiency of 60 to 100 per cent were pyrites, vanadium, bauxite, mercury, and lead. Minerals which showed a 20 to 60 per cent self-sufficiency were zinc, copper, and tungsten. The minerals with a 1 to 20 per cent self-sufficiency included chromium, manganese, cobalt, antimony, and platinum. The United States had essentially no production in tin or nickel. We are rapidly losing our predominance in the production of non-ferrous metals. During the war years we lost our self-sufficiency in copper, lead, and zinc. It is estimated that 97 per cent of the original commercial

reserves of mercury are exhausted. The United States is poorly endowed with most of the ferro-alloys and, except for molybdenum, is dependent on low-grade ores or must import its supply.

While the United States is still a "have" nation in most of the basic minerals, the mineral policies of the nation will gradually change. Our mineral economy is based on the development of high-grade ores. As high-grade reserves are depleted, new metallurgical processes must be developed to utilize the lower-grade ores. The discovery rate is declining. Since the present exploration is based largely on surface indications, new subsurface techniques must be developed. It can also be expected that the mineral imports will increase so that a sound foreign mineral policy needs to be instituted. In the pattern of mineral production, the trend toward greater centralization of mines will continue at an increased pace. Thus, the small mines will disappear and the great mines will grow larger.

DONALD F. PUTNAM—*Manitoulin Island.*

Manitoulin Island, lying in the northern part of Lake Huron, has an area of 1,073 square miles and lays claim to the title of "the largest fresh-water island on earth." Geomorphologically, it is a very interesting section of the Niagara cuesta, lying in juxtaposition with the edge of the Canadian Shield. It is but sparsely covered with drift, and the direction of the last ice movement is clearly indicated. All but the very highest portions were inundated by Lake Algonquin.

The population numbers about 10,000, of whom about 25 per cent are Indians. The economic activities include agriculture, grazing, forest exploitation, and fishing. The pattern of land use is very strongly influenced by the physical environment.

Summer tourist traffic is very important and is particularly attracted to the shores of the large inland lakes of the island.

This paper is illustrated by numerous maps and photographs.

ERWIN RAISZ—*A Geo-graphic Cross Section from Matamoros to Mazatlán.*

This route is the most direct from the Eastern United States to the Pacific. Mazatlán is the nearest Pacific port to Columbus, Ohio, and it is almost half as near to San Antonio, Texas, as Los Angeles. As soon as the Matamoros–Mazatlán highway is finished and the harbor of Mazatlán is deepened, the latter may develop as a major port for the South Pacific.

Along the route are the cotton fields of Matamoros, the orange belt of Cadereytas, the rising industrial giant Monterrey, the wheat–cotton bolsón of the Laguna with Torreón, the fastest growing Mexican city. The route passes the great lumber centers, Durango and El Salto; it descends into the state of Sinaloa, into which drain 12 yet untamed rivers which, if utilized, may develop a rival to California. In Mazatlán itself two huge hotels are in construction in expectation of tourist travel.

In contrast with bursting energy and enterprise in the cultural centers, in the more remote villages life is mediaeval; there are no sanitary facilities whatsoever; and a woman may sit in the market for a full day to sell 50 cents' worth of beans and corn. It takes a three-day mule ride to descend from the western slope of the Sierra Madre

Occidental. But the people are healthy and energetic, and before long the "nearest-shortest" trans-continental route may assume its predestined rôle in Pan-American economy.

VICTOR ROTERUS—*Stability of Annual Employment—Cincinnati and Selected Cities.*

The economy of an urban area can be said to be at its best when those who seek work are able to find it under conditions conducive to maximum income. One of these conditions is the seasonal stability of employment. Annual income from wages is a function both of wage rates and continuity of employment. Where employment is relatively stable throughout the year, one of the factors tending toward maximization of annual income has been satisfied.

This paper analyzes the seasonal stability of employment in Cincinnati. The seasonal stability of Cincinnati is compared to that existing in thirty other cities in the United States. These cities, widely distributed throughout the country, were selected because of the existence of comparable data on wage levels and cost of living used in connection with other studies.

Among the 31 cities, it was found that those cities having a high employment component in the service activities, especially government, finance, and commerce, had relatively high seasonal stability—e.g., Washington and Atlanta. Among the dominantly industrial cities, high ranking was shared by Baltimore, Cincinnati, Indianapolis, Minneapolis, and several others. In notable contrast to these centers were such industrial cities as Cleveland and Detroit, the latter having the lowest ranking of the 31 cities.

Cincinnati exhibited higher seasonal stability with respect to employment in the non-agricultural group of industries than either Ohio or the United States. Although the service industries are among the most stable in Cincinnati, certain types of manufacturing rate favorably. These types include, among the large employers, printing and publishing, slaughtering and meat packing, foundry and machine-shop products, and soap. Least stable types of manufacturing include automobiles and parts, furniture and office fixtures, and radios.

Although the patterns of seasonality vary considerably by activities, the over-all pattern of employment in Cincinnati is characterized by a single peak, that in the fall. Certain industries had their lowest employment in the same period, others were having their peak—e.g., the dairy products and confectionery industries. This suggests the possibilities of interchange of employment among these industries to mitigate the adverse effects of seasonality, especially where the sex, skills, and wage levels of the employment in the complementary industries are generally similar. Male employment in Cincinnati is considerably more stable and seasonal than is female employment.

EARL B. SHAW—*Brazil's Banana Trade.*

In 1940 Brazil was probably the world's greatest banana producer and exported more of the fruit than any other country in the world. However, in contrast to the banana trade of Middle America which features the Gros Michel of the Musa

Sapientum group, Brazilian plantations export Nanica, a type belonging to Musa Cavendishii. Nanica is a shorter plant with smaller fruit, is more disease-resistant, and is less susceptible to wind damage than the Gros Michel. Export from the lowlands around Santos, the major producing area, to Argentina, the largest importer, dropped off sharply during the war years. There seems no reason to doubt, however, that with more shipping facilities available, banana export will resume its pre-war status. In fact, it may exceed pre-war figures, for large areas are available for increased production provided an expanding market lends encouragement.

THOMAS R. SMITH—*Industrial Recovery in Fall River.*

Seventy-five empty cotton mills and the resulting unemployed labor force have been the major attractions for new industry in Fall River during the past two decades. As in the days of its glory, the city's location convenient to Boston, Providence, and New York was an additional advantage, particularly in contrast with the cities of upper New England. Inducements have played a significant but rather intangible rôle in attracting new industries.

Most important among the new industries have been the "cutting-up trades," in this instance the cheaper grades of men's and women's clothing, men's shirts, men's furnishings, and curtains. Between 1941 and 1944 employment in these industries averaged 7,000 persons, 25 per cent of the total in Fall River manufacturing. Plants have been moved to Fall River from Boston, New York, Philadelphia, and Chicago. Other plants, as the industry expanded, were started as offshoots of existing establishments. In either case the industries fitted the local situation. These are labor-intensive, highly mobile industries with relatively undiscriminating requirements as to type of plant space and the nature of the prospective labor force. Marketing is on a national scale, chiefly through New York. The possibility of raw material supplied from local mills has had almost no influence. While the growth of these industries represents a degree of diversification, these industries, like the cotton mills, employ a high proportion of women and pay relatively low wages.

A somewhat greater degree of diversification has resulted from the significant development of rubber goods and metal fabricating industries during the past ten years. Employment in these industries has been about 4,000 in recent years, about 15 per cent of the city total. Some expansion in these industries was due to war contracts, but at least one of the metal industries has converted to peace-time production and the Firestone rubber plant continues to be the largest single industry in the city.

The geographic pattern of industry was set by the existing textile mills, but within this general framework there has been much change. Several of the mills abandoned by the textile industry have been destroyed, most of those remaining have been subdivided and leased. Ground floors of mills in good locations near the center of the city have been converted to stores with garment factories above. Less favorably located buildings have become apartment factories, sometimes with a portion of the space for warehousing and storage. The resulting complexity of building-use is more comparable to the New York garment district than to a textile mill town.

Problems still facing industrial Fall River are reflected in the 25 per cent decline in total industrial employment from the recent peak in 1941, and in the continued need for attracting industries which would increase the percentage of male employment.

FLOYD A. STILGENBAUER—*Detroit's Expansion into the Umland, and Related Recreational Planning of the Huron-Clinton Metropolitan Authority.*

During the summer of 1946 a reconnaissance survey was made of the Huron-Clinton Metropolitan Authority area which comprises the counties of Wayne, Washtenaw, Livingston, Oakland, and Macomb. The purpose of the survey was to show how Detroit was expanding into the Umland and what natural and cultural factors were contributing most to the form of growth of this large American metropolitan city. Metropolitan Detroit is established entirely on the basis of the functional uses of the land within the Huron-Clinton Metropolitan Authority area. Functional uses of the land as established in this survey are (1) urban, (2) suburban, (3) suburban-rural, (4) rural, and (5) recreational. Arbitrary boundaries are ruled impracticable for the establishment of a metropolitan city. Instead, the actual functional service rendered by the land of the site together with the resources of the *umland, hinterland,* and *das entfernte land,* are considered, along with the development of transportation routes and the spread of population, to display the metropolitan urban growth. The net results of this survey show (1) the most exacting form of metropolitan Detroit, (2) the trend of growth and expansion into the Umland, and (3) the spread of population in relation to adjustments to the natural environment and the resulting cultural aspects of production, transportation, markets, and recreation.

PARIS B. STOCKDALE—*Yellowknife: A Gold Rush Town on the Doorstep of the Canadian Arctic.*

Abstract not received.—*Ed.*

HENRY J. WARMAN (Introduced by Samuel Van Valkenburg)—*Problems and Progress in the Laguna District of Mexico.*

The programs of land redistribution and the experimental creation in the last twenty years of new agrarian communities have been of great interest. The cotton-producing Laguna district of Mexico, with Torreón the center, is the site of such an experiment.

The author was concerned with gathering first-hand information about the problems and progress of this region since the establishment of ejidos in 1936.

Some of the problems confronting the area are related to dealings between the Banco Ejidal and the farmers (ejidatarios), rivalry of Banco Ejidal and private institutions, resentment of small, independent farmers (pequeños), formerly the large land owners, toward the ejidatarios, and feelings of uncertainty on the part of industrial and commercial business houses in the area.

Problems within the ejidos themselves are many, namely, the variety of opinions expressed by the group before decisions are made, the allocation of work, timekeeping, purchase of equipment and care of it, types of agricultural methods employed, and graft.

The geographic factor of water supply, however, is the dominating problem before which all others fade. Maps of water distribution and wells are included in the study.

Progress in the area is evident in government coöperation to check insects and pests. Construction of dams in the mountains continues. The new Mexican administration is determined to improve the situation. The rapid inauguration of the plan was accompanied naturally by much confusion and uncertainty.

The answer to the man-land ratio question here has not yet been found, but much information has been brought to bear in seeking that answer in the Laguna district. The Laguna environment in the past has been handled by estancias. The present set-up includes independent farmers and communal farmers. Both of these past and present arrangements have failed to bring out the best use of the area. Perhaps an increase in the size of the individual holdings or an increase in the communal groupings will do so.

ECONOMIC AND REGIONAL GEOGRAPHY: THE ORIENT

ALFRED W. BOOTH (Introduced by Chauncy D. Harris)—*Railroads in India.*

Included among the chief characteristics of India's 41,000-mile railroad system are many which are typical of other great railroad systems. In its general physical appearance it is British; its basic pattern is much like that of the railroads of the River Plate region; its density of track and spacing of lines is comparable to that of Western Russia; in the kinds and types of goods moved it approaches the situation on the Granger lines of United States; in the matter of relative significance of passenger traffic it is much like the railroads of Northwestern Europe; and its break-of-gauge problem resembles Australia's. All of these and many other features combine to make the Indian railroad system one of the world's most distinctive and notable.

Differences in gauge might seem to give to India three separate railroad systems. Yet in spite of this, the basic pattern of the rail lines is one of three intertwining webs focusing in three great ports—Calcutta, Bombay, and Madras—and to which has been added the great braided pattern of the Indo-Gangetic Plain. In density of lines the railways of India, with 26 miles of track to each 1,000 square miles, fall into Jefferson's "railnet" classification. Variations in density are comparatively small, a condition which reflects, to a certain degree, the general suitability of much of India for railroad construction and the intention of its builders to have all parts of the country close to some rail line.

The twelve great railroad companies, each of which dominates a section of the country, are today almost entirely united in a single great government-owned and -controlled system. However, because of a long and complex history of construction and consolidation, great variations exist in the matter of rates, fares, and wages.

The over 600,000 passengers carried by the Indian railroads supply about 30 per cent of their earnings (as compared to about 12 per cent in the United States). In ton-miles of freight carried, India is comparable to Canada or Great Britain. Coal constitutes about 26 per cent of the freight tonnage, and agricultural products about 25 per cent. Reflected in the tonnage figures of each one of the sectional railroad companies is the dominant crop or product of the area it serves. The heaviest freight tonnage is carried by the railroads which serve the Chota-Nagpur industrial area. Because of primary design by the railroad builders, the chief flow of traffic is from raw material producing areas to ports so that "inter-territorial" traffic is rather more important than "intra-territorial." One of the problems of an independent India will be to adjust its railroad system to an increasing intra-territorial need.

HERMAN R. FRIIS—*The Lower Indus Valley, India.*

The Lower Indus Valley, particularly the areas easily irrigated by the waters of the Indus river system below Ghotki (Sind), has been a culture hearth probably since 2000 B.C. Across this hearth and in most instances for periods of centuries, there have passed successively different and sometimes complex cultures such as that of the Dravidians, Mohengo Darians, Greeks, Hindus, Arabians, Delhians, and Anglo-Saxons. Inability of the inhabitants to successfully cope with the critical problems of flood control, a fickle climate, the growth and belligerence of neighboring civilizations, frequent crop failures due to drought, and the not infrequent mass exodus of peoples to more promising areas of India, have, until recently, precluded the development of a progressive and stable population. The impress of scientific achievements from the West, particularly from regions with problems of a similar nature, is contributing mightily to the development of a planned economy and to a more profitable use of the natural and human resources of this region.

The Lower Indus Valley is a geographic region comprising an extensive alluvial lowland, whose meander-scarred level surface is broken only occasionally by a few isolated rounded limestone hills. Superimposed upon this surface and constantly reshaping its physical features as well as its economy, is the distributary system of the fickle Indus River. Bounded on the west by deeply dissected, nearly vegetationless, north-south trending, folded sedimentary ranges, some of which attain heights of over 6,000 feet, and on the east by the aggraded, occasionally undulating desert plain of the Thar, the Lower Indus Valley spills across a mostly sterile, continuously reshaping delta surface whose seaward edge is a maze of tidewater features.

The recent growth of Karachi City on the delta and the diverse activities of the population in the region are a response to the advent of modern science, and offer an excellent study in the rejuvenation of a landscape.

This study is a product of field work, examination of aerial photographs and maps, aerial reconnaissance, and research by the writer made possible during his tours of duty in the Armed Services of the United States. The writer is particularly indebted to Professor Maneck B. Pithawalla of Karachi, eminent authority on India, for helpful suggestions gained in conversations in February, 1945.

SHANNON MCCUNE—*Geographic Landscapes in Korea, Asia.*

The "other" Korea, with which this paper deals, is a minute segment of the subcontinent of India. The native state (a part of the Northeastern Tableland of Peninsular India) has an area of 1647 square miles. Though located between the densely populated lower Ganges Plain and the Chattisgarh Plain, Korea had in 1941 a population of only 126,874 persons. This, however, was a vast increase from the 35,113 persons living in the state forty years ago. This growth of population is emblematic of the changing human uses of the jungle-covered hill land. The present activities of the people show the sequence of human economics and can be summarized by a description of three geographic landscapes. In the forests on the high-lying erosional levels of the north, primitive tribes practice a simple hunting and gathering economy together with some migratory agriculture. On the fertile land of the low-lying plains, Hindu farmers carry on a sedentary, self-sufficient agriculture, dominated by the cultivation of rice and other cereals. These people live in small villages and are bound by a tight caste system. Collieries and associated rail facilities and mining towns have been developed in recent years on bituminous coal seams which underlie the southwestern part of the state. These modern activities have drawn workers from both forest and agricultural pursuits and have provided revenue for development of the state. The coal mining may become the basis for industries which will further modify life and landscapes in Korea.

SHU-TAN LEE (Introduced by O. E. Baker)—*The Demarcation of Geographic Regions of China.*

In view of the complex physical elements and the great difficulty of delimiting regions with satisfactory boundaries, Otto Maull of Germany advocates an objective method of regional demarcation by drawing a series of borders, one for each significant element, to form line bundles or the so-called "boundary girdle," which are taken in order of their size as major and minor regional boundaries.

The author, by applying this method to the case of China, finds it satisfactory. To combine the well-established regional boundaries of climate by Coching Chu, of topography by J. S. Lee, of drainage by F. Hung, of soil by James Thorp, of vegetation by P. V. Huang, of land utilization by J. L. Buck, and of agriculture by Hanyuan Hu, and put them down overlappingly on one map, he finds that these lines run rather closely together and the boundary girdles thus formed can be carefully discerned (Map 1). Wherever four out of the seven above sets of lines run closely together, a principal boundary is obtained.

Twelve major geographic regions are thus constructed by connecting these principal boundaries. They are: the Northeastern, Sinkiang and Mongolia, Tibet, the Loess region, North China, Central China, Czechuan, Yunnan and Kweichow, the Yangtze and Lake region, the Southeastern, the Si-kiang region, and the Shanghai-Nanking area (Map 2).

The regions thus demarcated show better representation of geographic characteristics of each than demarcation based on climatic or soil or topographic conditions

alone, and are useful to serve as units for planning the post-war regional specializing economic development of China. In the author's opinion, this demarcation is more objective than that of Chi-yun Chang (Map 3) and others in China, and that of G. B. Cressey (Map 4) in this country.

GEOGRAPHERS AND THEIR WORK AND WORKS

SUPRAKASH GHOSH (Introduced by John K. Rose)—*Progress and Prospect of Advanced Geography in India.*

In India, Geography on the college level began its real career only about a decade or so ago. Previous to that most Geography resolved itself into "high school geography." But during this brief period the science has made substantial headway in the educational sphere. Among the circumstances affecting its progress is the partial crystallization of opinion recognizing its place in higher schools (universities and colleges) as a major subject for the degree B.A. and post-graduate courses. Still, Geography remains a neglected subject, reflected by the fact that out of the eighteen major universities in India, advanced courses are offered at only nine schools, while offerings in the post-graduate classes are limited to only four universities.

Courses on principles of physical and human geography, together with those on regional geography, generally dominate the undergraduate curriculum. Considerable emphasis is given in some schools to laboratory and field work, somewhat more than what is usually offered in this country.

The post-graduate courses are quite advanced in nature, but there seems to be some need for reorientation of the offerings to suit changes in scientific and regional outlook.

On the whole, advanced courses in Geography are largely modeled after "British lines."

Among the senior geographers the trend of thinking is largely associated with physiography, historical geography, and regional geography. The present tendency is gradually veering around the various applied aspects of the science, instead of being limited to the purer academic interests. Local and regional problems are being given emphasis and attempts are being made to create active interests among the younger geographers in the study and analysis of the various national and regional problems.

LESLIE HEWES—*Summary of Survey of Dissertations in Geography.*

A survey has been made recently of doctoral dissertations in geography accepted by American and Canadian universities during the period June, 1935, to June, 1946, together with those now in progress. Some of the gleanings from the survey are presented here in the hope that they will help to indicate the recent and present position of geography in North America.

Of the 162 dissertations accepted in the last eleven years, most can be classified as other than regional geography although practically all lend themselves to regional

classification. Only 21 are classed as regional studies exclusive of the 28 classed as physical, 6 as "adjustment" studies, 44 as economic, 26 as urban, 27 as human or cultural other than the above, 2 as political, and 7 as miscellaneous.

In comparison, of the 60 reported as now in progress, 14 are classed as physical, 1 "adjustment," 17 economic, 7 urban, 7 human or cultural other than the above, 5 political, 7 regional, and 3 miscellaneous. Those showing substantial gains are physical (chiefly at Harvard) and political (chiefly at Clark). "Adjustment" studies show the greatest loss. For both periods, economic studies (those of a topical and regional character together) lead. There is only one title in cartography, included in the group now in progress, and there is scant attention to geographical forms or types throughout. The chief departmental specialty shown is urban geography at Chicago.

In the main, departments granting degrees have done so before. Schools, with numbers of degrees granted, are: Clark, 36; Chicago, 28; California, 13; Michigan, 13; Wisconsin, 12; Harvard, 11; Ohio State, 9; Peabody, 9; Nebraska, 8; Columbia, 5; Washington (Seattle), 4; Teachers College, Columbia, 2; Louisiana, 2; Toronto, 2; Washington (St. Louis), 2; and one each at Cornell, Dropsie, Marquette, Minnesota, New York, and North Carolina. Of these, 4 degrees (Cornell, Dropsie, Marquette, and New York) were granted by non-geography departments. The remainder, except for the combined departments of Geology and Geography at Harvard and Louisiana, were granted by independent geography departments.

Dissertations were reported in progress at Clark, 12; Harvard, 12; Chicago, 6; Columbia, 4; Maryland, 4; Nebraska, 3; Ohio State, 3; two each at Teachers College, Columbia, Indiana, Louisiana, Michigan, Toronto, Wisconsin, and one each at California, Illinois, Pittsburgh, Peabody, and Washington (St. Louis). The larger gains were registered by Harvard, and Maryland, chiefly in physiography and economic geography, respectively. All but ten of the dissertations in progress are being directed by the members of the geography and combined geography departments who directed dissertations in the 1935–1946 period.

W. L. G. JOERG—*The Statistical Structure of American Professional Geography in 1943.*

The paper consists of an analysis of statistical data relating to about 800 persons with training in geography, and attempts to interpret some of the significant facts and trends disclosed. It is accompanied by a diagram in the form of the customary pyramid diagram of census vital statistics, distributed by age levels, that indicates training by type of degrees conferred and, in the case of six leading institutions, by name of conferring institution. The data are derived from the replies to questionnaires sent, mainly at the instigation of Professors Preston E. James and Richard Hartshorne under the auspices of the Division of Geology and Geography of the National Research Council, to a large number of persons believed to qualify as professional geographers.

HOYT LEMONS AND ROBERT D. CAMPBELL—*The Rôle of Geography in Quartermaster Research.*

The object of Quartermaster research is to maintain the soldier at peak military efficiency anywhere in the world by improving his protection against, and adaptation to, the total environment. Such a program involves the study of (1) man, the military tasks he performs, and his clothing, equipment and food; and (2) the environment. The sciences concerned in group 1 are basically non-geographic. Those in group 2 are completely geographic. However, this apparent distinction is not clear-cut; the singleness of the objective necessitates a high degree of cooperation and coordination. Non-geographic studies must be viewed against the background of environment. Thus, in studies of man, the geographer works closely with the physiologist, anthropologist, and psychologist. The same is true in the fields of physics, bio-physics, and bio-chemistry, which are involved in the studies of clothing, equipment, and food; and even more so in the case of job analysis, which to the Quartermaster means a study of man's needs in, and qualifications for, performing military tasks in a variety of environments.

The job of the geographer is, then, twofold: to supply environmental information to, and measure environmental elements for, the technicians representing other scientific fields in Quartermaster research; and to study the total environment, with the aid and cooperation of the other sciences involved, in an attempt to classify it according to the soldier's needs and responses. The research program outlined to direct the performance of this task involves both physical geography (climate, terrain, soils, vegetation, insects, animals, micro-organisms, and water supply) and cultural geography (population distribution, economic geography, local customs and adaptations).

The end product of such research is, wherever possible, some form of graphic presentation—a map, chart, or graph; the aim is to present environmental information in as usable a form as possible, interpreted for Quartermaster needs. In no field is the research completely inclusive; nothing is considered that is not pertinent to the major objective. In most cases, this results in investigation of only a small phase of each of the listed subjects. For example, the chief objective of climatological research is to develop a climatic classification which will accurately indicate the protection requirements of a soldier in the field.

Even with this limitation, the scope of the entire program is tremendous. To augment the work of the staff, the Office of Quartermaster General has appointed recognized authorities in their various fields as consultants, has let contracts with Universities and private research organizations, and has made reciprocal work arrangements with other government agencies doing work of similar nature.

ALFRED H. MEYER—*A Geographic Classification of Geography Material as Based Upon the Dewey Decimal Library System.*

It is a matter of common knowledge to geographers and librarians alike that both the Dewey Decimal System and the Library of Congress System fail to provide a

"geographic" classification for most of the academic publications appearing in the various branches of the rapidly expanding division of human geography.

Lack of such a classification results in illogical and inconsistent practices of cataloging genuinely geographic material as is revealed by a survey of the classification practices of over a hundred of the largest school libraries in the country.

Books, by geography specialists, with a distinct geography title, with genuinely geographic contents all the way through, and designed primarily for classes in geography taught by professional geographers, will be given non-geographic call numbers. This results in a scattered, unsystematic, and illogical arrangement, defeating the very purpose of a library classification itself and detracting immeasurably from the efficient use of the geography section in the library, if there is one at all.

The purpose of the present paper is to cite specific examples of such indiscriminate cataloging and to stimulate, by concrete suggestions, an interest in this problem and its solution as far as libraries are concerned which use the Dewey Decimal System and which do not choose to use a specially designed system for geography such as has been adopted by the American Geographical Society.

ROBERT S. PLATT—*Environmentalism and Geography.*

For a generation geographers have been warned against the dangers of environmentalism and in general have taken warning. But in mild endemic forms environmentalism lingers on, supported by the superficial impressions of common experience, in the same way that ideas of a flat earth or of racial superiority lingered on against new knowledge. Natural environment is important though not in the simple way that common-sense ideas of environmentalism seem to indicate.

Probably environmentalism has served a good purpose in the advance toward practical understanding of life on the earth. But for further advance more valid concepts have become available. The time has arrived to drop the remnants of environmental thinking and make full use of more effective means.

The field of geography as a study of our world from the viewpoint of its areas implies no prejudice in favor of the natural environment as a causative factor. Geographers can no more afford to be chronically biased in favor of this one set of earth features than historians and other social scientists can afford to be chronically biased in favor of a contrary set. Geographers and other scholars look at the same world from different viewpoints, and their views should supplement each other in terms which ultimately fit together. Appreciation of the natural environment but emancipation from environmentalism is needed both in geography and in the other disciplines.

HISTORICAL GEOGRAPHY AND CARTOGRAPHY

GEORGE KISS—*Japanese Influences on Western Cartography in the Middle Tokugawa Era.*

By the middle of the 17th century the cartographic image of Japan, first formed by the Spanish and Portuguese mapmakers, was rather well established in the West.

Witness the Jansson map of ca. 1650, "Nova et Accurata Japoniae . . . ," incorporating the latest discoveries by Dutch navigators, and referring to lands north of Honshu, Hokkaido, and the southernmost Kuriles! It is only in the latter part of the 17th century that cartographic information of Japanese origin, mostly consisting of place names and the names of provinces (Kuni), finds its way into Western maps. While provincial boundaries are indicated on the map of Father Briet (1660?), who undoubtedly obtained his information from Jesuit reports on Japan, the outstanding examples of Japanese influence on Western mapmaking are the maps of Reland (ca. 1715), Scheuchzer (1728), and Seutter (1730). On these maps, Japanese characters for the names of provinces, together with their Occidental equivalents, and the distorted shape of the main islands indicates extensive use of Japanese source materials. The appearance of these features on Western maps at a time when the cartography of the western Pacific was fairly well established indicates the importance attributed by the makers of some Dutch maps to cartographic intelligence provided by the Dutch factory at Nagasaki, only Western observation post in the forbidden empire of the Tokugawa shogunate.

CLARA EGLI LEGEAR—*Cyprian Southack, an Early American Map Maker.*

Cyprian Southack is among the earliest of American map makers. Born in London in 1662, he arrived at Boston twenty-two years later as an officer of the Admiralty coast guard. There he died in 1745. Between 1690 and 1712, he was successively a privateer, the captain of several naval vessels, and guardian of the Massachusetts coast. He participated in all the expeditions against the French and Indians in Nova Scotia and distinguished himself at the final taking of Port Royal in 1710. He made upward of twenty-four maps, mostly from original surveys, of which several have yet to be located. His chart of "The Harbour of Casco Bay and Islands Adjacent" appeared in more than twenty-five editions of the *English Pilot, Fourth Book,* between 1721 and 1794; his "Map of the Coast of New England" was included in various issues of the same publication from 1775 to 1794.

Southack's "New Chart of the English Empire in North America," dated 1717, is the earliest known copper-engraved map printed in the United States. The earliest map known to have been printed in the United States is John Foster's woodcut map of New England, published at Boston in 1677 in Hubbard's *Narrative of the Troubles with the Indians.*

The New England Coasting Pilot is Southack's most important map contribution. He prepared it during the twenty-two years from 1690 to 1712 while he was in the employ of the Massachusetts Bay Colony as captain of the *Province* Galley. It comprises eight folded maps on the scale of 1 : 590,000 which, when joined together, form a single map 52 by 108 inches. Stretching from New York to Cape Breton, it is profusely annotated with descriptions of settlements, harbors, fishing banks, available timber for shipbuilding, &c., and even marks the place on Cape Cod where seven pirate ships ran aground. The exact date of publication is not known, but unpublished correspondence between Southack and his London agent indicates it had

not yet been published in 1725. Separate sheets of this Pilot were advertised as having arrived from London in 1729. The three known copies of *The New England Coasting Pilot* were probably published in 1734. They are respectively in the Library of Congress, the British Museum and the British Public Record Office. The eight sheets, joined together as a single map, were issued with minor changes in 1758 and again in 1775.

LAWRENCE MARTIN—*The Association of American Geographers as a Part of the National Agricultural Jefferson Bicentenary Committee.*

Thomas Jefferson was distinguished as a geographer, capable as a surveyor and maker of maps. He was also a successful farmer and all the tracts he surveyed were agricultural lands. Many of his maps were produced for planning the administration of his farm at Monticello. One he printed in 1787, and modestly failed to sign, is important in American history and agricultural and military geography. There is much good geography in his "Notes on the State of Virginia," dated 1782. He began advocating geographical education throughout United States in 1817 by recommending "a few well chosen books [in] a small circulating library in every county." Greely, Surface, Brown, Bennett, Kellogg, as well as Mrs. LeGear and other members of the staff of the Library of Congress, have made geographer Jefferson's name familiar within our guild.

Geographical memorials to this gentleman include 569 Jefferson Streets within the District of Columbia and 46 of the States, a 2269-mile Jefferson Highway between New Orleans and Winnipeg, a 119-mile Jefferson Highway between Richmond and Staunton, Va., and a 9-mile Jefferson Notch Road in the White Mountains. There are 26 Jefferson Counties, 65 cities or villages bearing his name, 7 Mount Jeffersons, 6 Fort Jeffersons, 8 streams, lakes, or harbors named for him, and 6 glaciers, ravines, or passes. One finds 176 Jefferson Townships or Districts, a Jefferson National Forest, and the Jefferson Territory which was the Colorado of 1859–61, aggregating more than 900 Jefferson place-names including 43 Jefferson High Schools in District of Columbia and 19 States.

Without duplication, the area of places and things named Jefferson is some 27,651 square miles, a tract larger than New Hampshire, Vermont, Massachusetts, and Rhode Island. The population of this area is over 2,000,000 or nearly as many as lived in 1770 within our British North American Colonies, or inhabited Arizona, Rhode Island, New Hampshire, and Vermont in 1940.

Among surviving maps by this cartographer, the most interesting are the Jefferson Plan which antedated the L'Enfant Plan of Washington, D. C.; the engraved 1787 "Map of the country between Albemarle Sound and Lake Erie . . ."; the manuscript copy of Jefferson's map showing Michigania, Illinoia, Washington, and other provisional states of the old Northwest Territory, and the maps of Natural Bridge and of Monticello.

Having 900 place-names "Jefferson," many of them bestowed by farmer-settlers, it seems improbable that any large percentage of American agriculturists are un-

familiar with the Virginia farmer and two-term President for whom these features were named. Jefferson had adopted contour plowing, imported seeds and tree slips, introduced on his farm the seeds brought by Lewis and Clark, fostered the Albemarle County Agricultural Society, invented the mold-board plow, founded the University of Virginia. He wrote the Ordinance of 1784 which led to the organization of states within the Old Northwest Territory, giving us Ohio, Indiana, Illinois, Michigan, Wisconsin, and eastern Minnesota. Small wonder that they named their townships, cities, villages, and streets after him.

It was Jefferson who doubled the size of the United States by the Louisiana Purchase which gave us 13 additional states between the Mississippi River and the Rocky Mountains. He acquired it for four cents an acre. He sent out Lewis and Clark, who helped demonstrate the wisdom of the Louisiana Purchase, as did Zebulon Pike's expeditions, and finally gave us the whole Oregon Country.

In the Declaration of Independence, not forgetting the needs of farmers, Jefferson inserted the charge that George III had "endeavored to prevent the population of these States; for that purpose obstructing the Laws for Naturalization of Foreigners; refusing to pass others to encourage their migrations hither, and raising the conditions of New Appropriations of Lands."

Representation of AAG upon this NAJBC committee has resulted in selection of six maps, a diagram, and a photograph which will be available as a map display at the Columbus meeting.

DAN STANISLAWSKI (Introduced by John B. Leighly)—*The Rivalry of Two Cities.*

Directly after the conquest of Mexico City, a territory to the west, now the state of Michoacán, was brought under Spanish control. Because of conflict among the Spaniards, the economic and social framework of the native state in this territory was badly disrupted. An official inquiry into the conditions of the Indians was instituted, and Vasco de Quiroga was appointed bishop of the province. With a sympathetic understanding of the Indian mode of life, he established the provincial capital at Pátzcuaro. His choice of a site was geographically reasonable, in view of the requirements of the Indians. Pátzcuaro was centrally situated, with respect both to the native routes of trade and to the pine-covered slopes that were requisite to the native techniques of agriculture. The Viceroy of New Spain, Mendoza, had other ideas. His interests did not center on Michoacán, and certainly not on the Indians. His responsibility included all of New Spain. He was attracted by the site of the present town of Morelia, the qualities of which strongly recommended it to the Spaniards, with their European animals, crops, and techniques.

In spite of the Viceroy, Pátzcuaro, because of its excellent situation as a center of administration for the semi-isolated Indian province, remained its capital until the last quarter of the sixteenth century. It was finally eclipsed by its rival, Morelia, not because of happenings within Michoacán, but because of the discovery of mineral deposits, especially of silver, to the north. The Bajío, an area of valley lands, which includes northern Michoacán and extends to the site of Morelia, came into promi-

nence because of its ability to supply food to the mining communities. After the discovery of the silver mines of Zacatecas, the sites on which the prosperity of New Spain rested lay along a north-south route extending from Mexico City to the northern mines. Morelia lay on this route, but Pátzcuaro was off to one side of it. The rivalry of the two towns eventuated in the transfer of the seat of provincial authority from Pátzcuaro to Morelia in 1579.

PHYSICAL GEOGRAPHY—PAPERS IN HONOR OF WALLACE W. ATWOOD—RICHARD JOEL RUSSELL, CHAIRMAN

WALLACE W. ATWOOD, JR.—*The Relief Globe, A Study in Landform Presentation.*

The rapidly growing interest in global problems, both scientific and cultural, the globe-circling air-routes and the prospect, or at least the possibility, of global atomic warfare have made the construction of an accurate relief globe one of the "musts" on the list of cartographic assignments. The extensive mapping activities of the past few years have given us new and valuable data concerning the geographic positions of land areas and the topography of continents and ocean bottoms. Much of this information is being compiled on flat maps now in process of construction, but not until it is assembled on a globe, in full relief, will the true relationships be correctly shown.

Demands for an accurate relief globe have been received from five different government agencies, from scientists concerned with geological structures on a world scale, from commercial airlines, industrial houses, and a score or more of educational institutions. These requests are not interested in the "exhibit" globe of the past—they want the true global map which can be used for careful analysis of relief features and the correct measurement of heights and distances.

The construction of a relief globe to serve the exacting needs briefly stated above is possible. It will require the preparation of a new base map embodying the latest information from land, air, and ocean-bottom surveys. The compilation of these data must be on a spherical surface. It will require extreme care throughout construction operations, and must retain accurate geographic positions and true earth's curvature. Experienced terrain specialists must be engaged to model the land forms from maps and air photographs and to interpret ocean-bottom topography now revealed by thousands of soundings. When the globe is complete, experts in rubber, metal, and plastic casting must be employed to faithfully reproduce the original master in various media. Most of the methods and techniques essential to perform these operations have been developed during the war years.

The size of the globe should be determined on the basis of intended use. It is proposed to make several, ranging in size from 3 to 10 feet. Construction should start sometime during the year 1947.

NELS A. BENGTSON—*Geographic Aspects of Pump Irrigation on the Nebraska Loess Plain in Relation to Subsurface Physiography.*

The Loess Plain is a roughly triangular area of about 8,000 square miles in the south-central part of Nebraska. Its east-west extent is approximately 150 miles

and the base of the triangle is approximately 80 miles from north to south. The upland slopes east-southeasterly at an average gradient of 6.5 feet per mile. The shallow drainage courses are meandering, with low gradients, and slopes so gentle that tillage farming is not obstructed. The soil is rich in soluble minerals and in its virgin state is moderately well supplied with organic content. The area may rightly lay claim to as low percentage of non-tillable land as any of like size in the United States.

The most acute agricultural problem is the lack of dependable rainfall during critical months of the year. When moisture is then deficient, low yields or crop failures result, although the other months of the year may have normal or nearly normal rainfall. Because of this situation, supplemental pump irrigation often spells the difference between success and failure in economic agricultural production. Early observations led to the impression that the underlying bedrock surface was a fully-developed peneplain with low relief and that it was mantled with sands and gravels deposited during Pleistocene times in regular succession without any significant unconformities. Recent investigations have indicated that the bedrock surface has considerable relief and that the mantle of gravels, sands, and silts provides evidence of several stages of deposition separated by erosion intervals.

The early impressions of an unbroken mass of saturated sands and gravel co-extensive under the entire plain must be modified to take account of buried ridges of bedrock and lens-shaped masses of permeable sands and gravels separated by relatively impermeable clays. The complex physiography beneath the flat, monotonous plain should first be tested by narrow-gauged boring when seeking well-water supplies of sufficient flowage to support the large-diameter rotary pumps used for irrigation. However, favorable subsurface conditions for the accumulation of large water supplies are so extensive that supplemental irrigation promises to become a factor of increasing importance in the agricultural economy of the area.

Since the turn of the century the Nebraska Loess Plain has been the scene of extensive farming, of increasing size of farm units, and of decreasing rural population. The effect of this trend has been for many small towns, formerly important trading centers, to become ghost towns, and for rural schools to become problem institutions because of the fewness of pupils. Since irrigation farming is of the intensive type the extension of supplemental pump irrigation is producing a trend in the opposite direction. If this trend continues, as now seems likely, rural population will increase, rural schools and churches will become numerically larger, and trading centers will regain at least some measure of the prosperity characteristic of the earlier years. Furthermore, pump irrigation will stabilize production and give fairly assured income through dry years as well as wet ones. Pump irrigation is practicable because for any given year the application of from two to six inches of water at critical times usually spells the difference between poor crops or failure on the one hand and large yields and success on the other. The changing pattern, however, will not be universal as was formerly thought, because of the complexity of structure under a plain so flat and monotonous that earlier students could hardly conceive of such complexity underneath.

ANGUS HILLS (Introduced by Donald F. Putnam)—*Land Forms in the Clay Belt of Northern Ontario.*

The physiographic features which dominate the Clay Belt landscape and determine its basic land-use pattern are, unquestionably, the smooth, heavy deposits of Lake Ojibway–Barlow and contemporary ice-sheets; but the most striking features indicative of variations within the basic land-use pattern are the long trains of glaci-fluvial sands and gravels running at regular intervals in a northerly-southerly direction across Canadian Shield and Clay Lowlands alike.

Rarely of the simple, sinuous, knife-edged type of esker, these trains assume such complex forms as: (A) narrow flat-topped beaded eskers, (B) attenuated plains of sandy outwash characterized by strings of kettle-lakes and dry pot holes, (C) broad outwash plains with kames and kettles.

Subsequent modifications by wind, water, or ice increase this complexity. Where these trains terminated in Glacial Lakes Barlow and Algonquin, the outwash sands merge with deltaic materials. On the Canadian Shield, beaches are common modifications. Winds have superimposed many steep-sided and crescentic dunes, particularly in the exposed areas.

Where Ojibway clay is commonly at the surface, as in the Matheson area, a large proportion of each esker train is covered by varved clays and silts with, here and there, an outcrop of gravel, pitted sand or silty outwash.

A till sheet covers both lacustrine clays and glaci-fluvial sands over most of the Great Clay Belt, leaving only kettle lakes, gravel ridges, and better-drained clay areas to mark the course of the "esker." It is only in the flats of marine clay and beach gravel which encircle James Bay that no trace of them has been found.

In clay areas these trains may be traced by means of the better-than-normal drainage conditions as indicated by a more mesophytic vegetation, a thinner layer of peat and a more "normal" soil profile. Their effect upon wild and cultural landscapes is of extreme significance. On the Canadian Shield, they constitute practically the only deep drift, supporting better stands of timber. These trains are the sites upon which white and red pine have pushed a salient into the taiga of the Clay Belt. Their slopes and good internal drainage permit a mesothermal microclimate within the Boreal region. Though limited to comparatively narrow strips, varying from a few rods to three miles in width, these glaci-fluvial ridges, both visible and hidden, producing as they do the best potatoes, alfalfa, and other cash crops of the north, will determine the cultural and economic "contours" of agricultural development.

WELLINGTON D. JONES—*What Geographers Need to Know About Soils.*

Geographers, as with workers in most other disciplines, encounter the problem of becoming competent enough in related subjects to employ the portions of these related fields which bear on investigations they (geographers) pursue. If geographers are to understand and appraise agricultural land use, as well as some other phases of human occupance and use of regions, they must know certain things about soils as well as other elements of physical geography. Fortunately it is not necessary

for geographers to master all of soil science; also fortunate is the fact that such mastery as is desirable can be acquired gradually as needed. Furthermore, materials published in recent years by soils specialists make acquisition of requisite competence by geographers much less difficult than formerly was the case.

During the past twenty years the author of this paper has for numerous short periods been in the field with many of the best soils men in this country, with the objective not only of acquiring personal competence in soils for geographic purposes, but also of determining what parts of pedology (soil science) are useful to geography. He has found these soils men highly cooperative, and more than willing to serve as tutors; therefore he recommends frequent short field association with soils experts as the best way to knowledge. Study of appropriate selections from the voluminous literature on soils is as essential as is field experience with pedologists, for the latter cannot be expected to take their time to tell orally most of what is well put in print. Simple laboratory examination of samples of soil profiles also is helpful.

The following kinds of knowledge about soils are valuable to geographers: (1) how to examine soil profiles in the field for purposes of description, identification, and land use evaluation; (2) major and minor soil classification categories; (3) soil associations, which are analogous to vegetation associations; (4) catenas, which are locally related profiles developed as a consequence of differences in internal and external drainage conditions induced by differences in slope and topographic position; (5) maintenance and improvement of productivity of soils; (6) ability, from study of literature and maps, or from laboratory examination of profile samples, to compare soils not seen in the field with those of which a field study has been made; and (7) sufficient familiarity with soils literature, maps, keys, tables, to find readily what is pertinent to geographic investigations.

A. K. LOBECK—*The Physiographic Divisions of Africa.*

Africa, unlike the other continents, is essentially a single unit, the African Massive. Only the Atlas Mountains deserve separate recognition and they are actually part of the Eurasian Alpine System with no close relationship to the rest of Africa.

This means that the 40 or so subdivisions of the African Massive are not of the same order as the generally adopted physiographic provinces of the United States. Instead, they are more analogous to the "sections" or minor subdivisions of Fenneman's classification.

The greatest variety of physiographic features which have been brought about by the geological structure of the country occurs in the Sahara, because here the veneer of Paleozoic, Mesozoic, and even Tertiary beds has been warped and eroded to produce topographic forms not unlike the domes and basins of the central United States. Elsewhere it is the beveled surface of the old African complex, combined with profound faulting and volcanism, which provides the key to the African landscapes.

A diagram of Africa, published on a scale of 1: 14,000,000, together with a

tabulation of physiographic provinces and descriptive text has been prepared as a provisional attempt to present these facts.

RICHARD F. LOGAN (Introduced by Stephen B. Jones)—*A New Significance for Glacial Border Drainage.*

Field work in western New England has resulted in the recognition of a new glacial feature which can be of significance in determining the glacial history of the region.

The existence of drainage channels, carved in till along the margin of an ice-lobe, was early noted by field workers throughout the Northeast. Such features have no particular significance, however, other than showing the position of the ice-margin at a particular time.

In the Berkshire Hills of western Massachusetts, border drainage channels were early described by Taylor (Journal of Geology, 1903). They represent drainage along the flanks of lobes which, confined by the strong topography, assumed forms similar to those of valley glaciers of an alpine type. Carved in till on mountain fronts, these channels decline in elevation gradually to the southward.

Re-study has revealed a second feature: a conspicuous ridge commonly forms the downhill (iceward) margin of the channel. Where exposed in stream-banks and road cuts, it is seen to be composed of till, accumulated to a much greater thickness than on the surrounding terrain. For it, the term "lobe-edge embankment" is proposed.

The greater thickness of till implies a longer period of accumulation than normal, or else a greater supply of detritus; since it is associated with border drainage, peripheral accumulation is implied; hence it is a form of lateral moraine. Thus it represents a still-stand of the periphery of an *active* ice-sheet.

Discovery of such a feature is conclusive proof that the ice was not stagnant at the time its periphery passed the spot. In mountainous regions, conspicuous moraines are not easy to find, and definite indications of activity are often lacking. Further search may reveal more lobe-edge embankments in other areas.

LOUIS O. QUAM—*Origin of Estes Park, Colorado.*

Estes Park is a broad basin of about 25 square miles completely surrounded by mountains rising 1,000 to 6,000 feet above the park floor. Distinctive features are: (1) its long axis trends diagonally across the major lines of drainage, (2) its floor slopes eastward at about 200 feet per mile, a slope nearly twice the gradient of the main stream crossing it, and (3) its outlet is a narrow canyon.

The opinion that Estes Park is "an erosional valley modified by glaciation" is refuted. A combination of factors is required to account for the lowering of a broad park area below the bordering ridges of similar rock types while the outlet canyon remained narrow. Broad zones of sheared and jointed rock intersect at a place where infolded metamorphic rocks and *lit par lit* injected granite trend parallel to the streams. These conditions result in weakening of the rock within the park and along the lines of shear trending northwest, northeast, and east. The outlet stream

does not follow these zones of weakened rock to the east, northeast or southeast but, on leaving the park, flows across a particularly resistant granite which so retarded its erosion in the narrow canyon as to permit the streams in the park to become graded and to accomplish extensive lateral planation.

Five streams converge within the park, whose combined valley flats constituted the initial basin which was widened by the wearing back of the bordering slopes through weathering, slope wash, and undercutting. The streams that occupy the northeast trending shear zone seem to have been particularly effective in wearing back the eastern slopes of their valleys with a consequent eastward shift of the streams themselves. This process, taking place while the park was slowly lowered in response to the slow deepening of the canyon, developed a basin, elongated in a northeast direction and with an eastward sloping floor.

When finally the canyon stream reached its base-level, the grade of the park streams became stable, and, before rejuvenation occurred, a broad basin had formed in the park area and a U-shaped valley of early maturity, in the canyon. Renewed downward cutting after rejuvenation resulted in removal of all but scattered spur remnants of the former canyon floor, and produced the narrow V-shaped aspect of the present canyon. Within the park all streams developed narrow channels at least 20 feet deep. Glaciation in the headwaters of the major streams interrupted this last cycle of erosion while still in the youthful stage. Outwash gravels completely filled the narrow channels of the major streams and overlapped a considerable portion of the park floor. Three terraces of outwash have been correlated with three glacial stages.

Post-glacial modifications have been slight. Lack of mineralization and exclusion of agriculture have kept the park an unfenced, unmarred, open parkland.

ROBERT L. PENDLETON—*The Laterite Soils of Siam.*

Erroneous concepts of laterite and how it developed are the result of inadequate observations and insufficient data concerning equatorial soils. Laterite is an illuvial horizon, high in iron oxides, with a slaglike, cellular or pisolitic structure and of such a degree of hardness that it can be *quarried* out and used for building construction. A laterite soil is one in which a laterite horizon is found in the profile.

In soil survey field work field-applicable criteria for evaluating soils are essential. Laterite horizons are easily distinguished in the field; and since laterite soils are very low in available nutrients, the presence of a laterite horizon in a soil is an important criterion of soil character.

In Siam the laterite develops under two different sets of conditions: (1) in a peneplain or a stable alluvial plain, where the zone of annual oscillation of the water table is relatively fixed over a very long period of time, and is close enough to the surface of the soil so that ferrous compounds in the soil water are oxidized to ferric compounds and thus immobilized; (2) in the soil or on the surface of the lower slopes of hills, where ferrous compounds in the seepage water are oxidized to laterite. This emphasizes the significance of lateral movement in soil profile development.

While vescicular laterite tends to develop in a clayey matrix, and pisolitic laterite in a sandy one, the character of the parent materials is of secondary importance.

Not only are many ancient structures in Siam built of laterite, but the quarrying of laterite is an art still practiced there.

RICHARD JOEL RUSSELL—*Mississippi River Meander Belts.*

The Mississippi River below Cairo is a restless stream. In each recent decade it shifts to a degree equivalent to leaving about half of its original channel area in favor of occupying that much new territory. Such shifting, however, is normally limited to the confines of rather fixed areas: general courses or meander belts.

Three fundamentally different kinds of meander-belt channel exist: (1) braided, where bed load is abundant, (2) meandering, where bed load is in restricted supply, and (3) fixed, where bed materials resist scour effectively. Braided channels are common above Helena, meandering above Baton Rouge, and fixed channels downstream.

Along parts of the river where meandering is predominant the general position of the river course is most stable. Clay plugs form in cut-off lakes and hence along both margins of a meander belt. The river is unable to remove clay plugs, so remains confined between them. Only rarely does a diversion occur. In such instances the river finds its way out of a meander belt, establishing another meander belt downstream.

The history of Mississippi River courses and meander belts is known in detail since the date that the earliest alluvium was deposited on the valley floor below Cape Girardeau. There have been few major diversions and therefore few main meander belts. Each meander belt leads to its own delta.

PLANT GEOGRAPHY

GEORGE F. CARTER—*A Geographical Approach to the Solution of the Aboriginal Introduction of Maize into the United States.*

The distribution of types of maize among the American Indians has had relatively little detailed study. Fortunately, the U. S. Department of Agriculture made and has preserved a large collection of maize from the American Indians. A chromosomal study of the material from the Indians of the United States was published in 1938 by A. E. Longley. The presentation of the material was brief and in tabular form. The principal finding was that there was a steady decrease in knob numbers on chromosomes from south to north, and that the Southwest has particularly high numbers of knobs on its maize.

This same collection has now been measured in order to record the morphology of the ear and kernel. Twelve observations or measurements were made on each of the approximately 350 ears from 27 tribes. This mass of data has been reduced to averages for collections, and the results plotted on maps. Longley's chromosomal data has been similarly plotted. When presented on maps, this material gives a much more detailed and more easily grasped picture of the original distribution of

types of corn in the United States than we have had before. The basic picture is of recurrent introductions of maize types into the lower Mississippi drainage area and their diffusion northward and eastward. Questions about the possible separate origin of some Southwestern maize, of possible Southwestern and Southeastern maize relationships, the origin of dent corn, etc., are raised.

ANDREW H. CLARK—*Climatic and Edaphic Anomalies in the Pre-European Grassland of South Island, New Zealand.*

A grassland of remarkably uniform character occupied most of the eastern slopes and plains of the South Island of New Zealand in the early nineteenth century. The dominant form was that of a bunch, or tussock. Individual tussocks spread to form a continuous panoply, but were not contiguous at the roots. Intervening soil supported shade-tolerant herbs, sedges, and grasses.

The climate, over most of the more than 25,000 square miles of grassland, was one well on the humid side of the Cfb/BS boundary. There thus appears to be even less of a climatic basis for grassland development than in the "anomalous" C(D)fa(b) prairies of central North America and the Rio de la Plata. Precipitation is generally above 25 inches and mean annual temperatures range between 50° F. and 54° F., while the amplitude rarely exceeds 20° F. There is no marked seasonality of precipitation and winds are neither strong nor frequent over much of the area. A hot desiccating *föhn*, locally called the "Nor'wester," varies widely in frequency and effective incidence over the area.

A tendency to xeromorphism in woody plants sometimes associated with the grassland has led to hypotheses of geologically recent drought periods to account for the anomaly. The only substantial support for such suggestions that the grassland was not climactic are found in the surprising uniformity of the association in habitats of marked local variability. Non-climax theories have also received support from arguments that the grassland is largely a Maori cultural adaptation, but the evidence of widespread pre-existing forest cover is most tenuous. The only reasonable object of wholesale burning by the Maori would have been the hunt of the Moa. There is no satisfactory corollary indication that the Maori so far departed from the markedly conservational pattern of his neolithic culture.

Edaphic control, once strongly supported, appears to have been effectively ruled out by the variety of soil types discovered in the grassland area by recent surveys. The tussock appeared in vigorous expression on areas sharply in contrast with the coalescing gravel fans which supported the largest grassy area in the Canterbury Plains.

Complicating all hypotheses of climatic or edaphic origin is the marked success of planted exotics (such as *Pinus radiata*) which are self-seeding in many parts of the area. Islands of "sub-tropical" or "sub-antarctic" rain-forest, or of swamp-and-bog, occurred sporadically throughout the grassland, but long study of the boundary zones ("tension-belts") of these with the grassland has produced little help toward a solution of the problem. The native species, unlike the exotics, do not easily become

established in the grasslands, yet, where they have been undisturbed, are apparently neither retreating or advancing.

POLITICAL GEOGRAPHY

JAMES R. BECK (Introduced by Hallock F. Raup)—*Spatial Relationships between National Boundaries and the Limits of (1) Discrete Cultural Areas and (2) Areas with Conditions Favorable to Economic Integration.*

Different types of spatial relationships that are considered here have different impacts upon the lives of men. These relationships are subject to direct human control. Acts that either preserve or change existing boundary relations affect the spatial relationships under consideration.

Regional diagrams are employed to define four types of spatial relationships between national boundaries and the limits of culture areas and five types of spatial relationships between national boundaries and the limits of areas with conditions favorable to economic integration.

The conditions in individual countries are checked to determine for each the dominant spatial relationships of each of the two groups of relationships considered. The limitations of the technique are evaluated. The distributions of the nine types of spatial relationships are shown upon a series of maps. Conclusions based upon the evidence of these maps are summarized.

JOHN WESLEY COULTER—*Political Geography of Pacific Islands.*

The isolation of clusters of small islands in the Pacific, inhabited by primitive peoples, and the strategic importance of some of them, have had an important bearing on the development of their political institutions. Various forms of western government in the South Sea islands arise partly from the history of the particular archipelago or island, and in part from wide differences in economic development, geographical situation, the nature of the local resources and the racial composition of the people. In olden times government in the Pacific Islands centered in the Chiefs. The native priest or sorcerer frequently was the agent of the chief in enforcing government regulations. Various western governments imposed on South Sea people found it impossible to deal directly with native customs, traditions, and superstitions. The most practicable method of procedure was to allow the natives to carry on their own affairs with as little interference as possible. This was achieved by a so-called system of indirect rule. The policy of indirect administration is probably carried out more fully in the Gilbert and Ellice Colony than in any other archipelago in the Pacific. The main reasons for its success there are the isolation of the islands and the very small number of non-native inhabitants. Western administration of South Sea people is in general from an economic standpoint. Emphasis is placed on the production of money crops for world trade. Influential business men in the South Seas frequently have played a large part in government affairs. Occasionally both Protestant and Catholic missionaries have acquired an influence that government officials cannot rival. As a result of the second world war, the natives of the

Marianas, Caroline, and Marshall Islands have come under the rule of the Navy of the United States. Guam has returned to the *status quo ante*. No decision has yet been reached in regard to the future government of these islands. Three fundamental types of problems are involved—political, economic, and security.

The United Nations has aroused hopes in the minds of South Sea Island people for more self-government in the world of tomorrow. Three basic principles of far-reaching significance were embodied in the Charter of the United Nations: first, that nations responsible for the administration of dependent territories should recognize that they are accountable to the world community for the well-being and development of the people under their authority; second, that the political, economic, social, and educational advancement of dependent peoples is a primary concern; and third, that dependent territories must be administered in such manner as to contribute to the maintenance of peace and security.

OTTO E. GUTHE—*An Episode in Boundary-Making* (*Trieste*).

This paper is a brief resume of the investigations and discussions which led up to the recommendations of the Paris Conference for an Italo–Yugoslav frontier and a frontier for the Free Territory of Trieste.

A Commission of Experts was appointed in February 1946 by the Deputies to the Council of Foreign Ministers to investigate, on the spot, the Italo–Yugoslav boundary problem and to make recommendations on fixing the boundary, taking into consideration not only the ethnic composition of the population but also the special economic and geographic features of the area to be investigated. This Commission spent one month in Zones "A" and "B" of Venezia Giulia and subsequently presented a single report and four separate boundary recommendations to the Council of Foreign Ministers.

By July 3, 1946, the Ministers had decided that the "French Line" should be the western frontier of Yugoslavia and that an independent Free Territory of Trieste should be established west of the "French Line" from Duino southward. The Yugoslav, Byelorussian, Brazilian, and South African delegates took exception to this decision at the Paris Conference and proposed other solutions for the frontiers in this area. The majority of the delegates, however, upheld the Council's decision.

EARL P. HANSON—*Problems in Liberia's Economic Development.*

Our present Liberia policy includes aid toward that country's economic development, with the aim of strengthening trade relations between the United States and Liberia. Marked strides toward development are being made in and by Liberia. For 1½ years, the writer directed the United States economic mission, sent to study all problems related to development.

Surveys carried out proved Liberia rich in exploitable resources, including the largest timber-stands on the West Coast, limitless palm oils and fibers, good soils, fine clays and other materials suited for eventual small industries. Excellent possibilities exist for improving Liberian cocoa qualitatively and quantitatively, for sale

directly to the United States in return for American goods. Except for the iron deposits at Bomi Hill, little is yet known about mineral resources. An American concern was recently granted a concession for mining Bomi Hill ore, for shipment to the United States.

An obstacle to development is Liberia's political organization, under which 15,000 Americo-Liberians keep 1,500,000 aborigines in colonial subjugation. President Tubman, however, is carrying out drastic reforms, aimed at creating one unified citizenry with increased purchasing power and with equal rights and opportunities.

Another obstacle is the prevailing shortage of food supplies. The program for modernization and diversification of foodstuffs agriculture begun by my mission gave excellent preliminary results and showed the aborigines to be interested, intelligent, and adaptable.

Prevailing transportation is still by head-loading in the interior and surf-boats along the coast. Roads are being built and planned. Garages and improved coastwise shipping are planned. The United States Navy is building a commercial port at Monrovia. Iron mining at Bomi Hill will involve the construction of a railroad. Experimental donkeys introduced by my mission gave excellent results and promise immediate drastic improvements over head-loading.

The lack of skilled artisans, professional men, and administrators is being attacked by revisions in the educational systems of the government and religious missions, and by increasing scholarships for Liberians in the United States. Health problems are being attacked by the Liberian Government, aided by a United States Public Health Mission and French teams of technicians to combat sleeping sickness.

Britain and France watch the program with possibly more interest than enthusiasm. If successful in its aim to modernize the Negro Republic, it will result in shifts in American trade with Africa, and in the rapid voluntary abolition of one of Africa's colonial regimes. Even more important than the economic results may well become the program's repercussions throughout Europe's African colonial possessions.

RICHARD HARTSHORNE—*Geographic Definitions of Land, Sea, and Air Power.*

What effect does the growing importance of air forces, and likewise of more recent methods of warfare, have on the classical geographic distinction between land and sea power? Land power consists of armed men and equipment designed to operate in land areas, and the land fortifications designed as their protective bases. Sea power consists of armed men and equipment designed to operate in sea areas, and the fortified harbors designed as their protective bases. Overlap between the two has until recently been limited to (1) the narrow coastal zone in which combat between the two was possible, and (2) the use of naval forces in transporting land forces by sea.

Air forces are in several respects inevitably part of either land power or sea power: they must operate either from land or sea bases, and in either land or sea areas, or both; and until air commerce is important, they can attack, other than their

counterparts, only objects on land or sea. To a major degree their functions represent simply extensions and enlargements of the normal functions of land or sea forces. Their mobility, however, greatly extends the coastal margin of mutual combat and their technical character makes possible an easy interchange from land to sea power. In addition, the utilization of air forces for direct attack on the economy of the enemy constitutes a form of war largely independent of either land or sea forces. Air power, therefore, does not constitute a clearly marked third division of military power, neither is it clearly included in the functions of land and sea forces, and finally it has tended to break down the former relatively clear separation of operations of land and sea forces.

More recent developments force recognition of a new form of power even more completely independent of land or sea power. The known developments in rocket bombs and atomic bombs, not to mention the unknown possibilities of connecting the two or the secret developments in bacteriological warfare, represent a revolution in the geography of warfare. We must recognize the elimination of the protective function for the homeland of the battle line of armies and ships; we have seen the first steps in the elimination of the most important geographic element in protection—the factor of position and distance.

MARK JEFFERSON—*Europe's Control of the World in 1914.*

Read by title.

CLARENCE B. ODELL—*Significance of Population Studies in International Problems.*

Perhaps all problems of the World are in part problems of population. To geographers and to many non-geographers there is no need to emphasize the significance of a study portraying the distribution of population. In addition to distribution, basic research during the war included some study of population data on total, urban, rural, vital statistics of birth, death, and natural increase rates; population growth and projections; composition of population in terms of religion, language, and nationality differences; migrations and displacement of population; and the major occupational groups of workers.

It is possible to illustrate the use made of such population studies by referring to some of the research done in the Department of State under the direction of the Geographer of the Department. This research served in many cases as background information for policy decisions relating to international problems. In times of war or peace basic information of population structure and trends can be of utmost significance.

RALPH E. OLSON (Introduced by Samuel Van Valkenburg)—*The Grand Duchy of Luxembourg.*

The Grand Duchy of Luxembourg, with an area of only 999 square miles and a population approximating 300,000, has an international importance in western Europe little recognized on this side of the Atlantic. Situated on the south side of the Ardennes crest at the intersection of Germany, France, and Belgium, the Grand

Duchy has been a strategic crossroads since the time of the Roman Empire. The northern part of Luxembourg, commonly known as "Oesling," extends into the Ardennes Massif and is a cool, humid plateau area with an agricultural economy based on oats, rye, potatoes, and pasture. Central and southern Luxembourg, known locally as "Gutland," comprise an eastern extension of the Paris Basin. This is a region of general farming, with a strong emphasis on wheat, dairying, and the fattening of young pigs. Vineyards flourish on the sunny left slope of the Moselle Valley along the southeastern border of the country.

Industry, rather than agriculture, furnishes the key to Luxembourg's foreign economic relations. The northern end of the great Lorraine iron ore basin projects a short distance into southwestern Luxembourg. Local ore and imported German, Belgian, and Dutch coal have been combined in the development of an iron and steel industry which normally exports more than 90 per cent of its product. As recently as 1929 the Grand Duchy ranked seventh among world steel producers, and while its relative position has declined somewhat since that time it is still in a strong competitive position. Untouched by the air raids of World War II, the Luxembourg iron and steel industry will probably supply a large part of the structural steel needed for reconstruction in western Germany.

Luxembourg has been in existence as a political unit for nearly a thousand years, but during a period of about four centuries (1443 to 1839) it was forced to submit to foreign control. Under Spanish, Austrian, and French rule the Luxembourg fortress at the confluence of the Alzette and the Petrusse became the famed "Gibraltar of the North," an objective of numerous military sieges and diplomatic intrigues. Prussian troops took over the fortress after the Congress of Vienna in 1815, but evacuated it in 1867 under provisions of the Treaty of London of that year. Although politically independent after 1839, Luxembourg did not acquire its own ruling family until 1890, since which time it has been a hereditary Grand Duchy under the House of Nassau-Weilburg.

From 1842 to 1918, Luxembourg was a member of the Zollverein, but since 1922 it has had a customs union with Belgium. The economic reorientation was accomplished satisfactorily by most branches of agriculture and industry, and the percentage of foreigners has dropped somewhat from the 18 per cent peak reached in 1930.

FRED K. SCHAEFER (Introduced by Harold H. McCarty)—*Geographical Aspects of Planning in the U.S.S.R.*

Planning in the Russian technical sense of the term is a conscious effort to direct social forces towards a rationally desirable end. Planning without a definite goal is not planning. In the light of this theory most state planning in the United States during the Thirties appears to be mere surveys or analyses on a pre-planning level.

Russian planning involves the following principal steps: (1) the establishment of a goal to be reached in a given time and by means which are in harmony with the social and ideological background of the region; (2) a quantitative and qualitative analysis of the given region; (3) the projection of the growth of the region including

a prediction of the quantitative and qualitative physical, economic and social relationships to be found at the end of the planning period; (4) an estimate of the means necessary to effect the change within the region, such as capital, resources, manpower, institutions, land, sites, etc.; (5) finally, the integration of this regional plan with other existing regional plans on a national scale.

Each regional plan involves two fundamentally different methodological approaches: a functional and a regional approach. The functional type of work is carried out by the economist, the sociologist, the engineer, the geologist, etc. The regional work is done by an integrator who ought to be a geographer or ecologist, but in reality is usually an engineer or economist due to the fact that those disciplines have developed beyond the descriptive and analytic stage and consequently have been able to develop a larger arsenal of planning techniques capable of prediction. The regional concept as developed by geographers has become one of the most important tools in planning. Planning should be looked upon as applied geography. It offers an excellent testing ground for theories developed by regional geographers.

SAMUEL VAN VALKENBURG—*Changes in the Ethnographic Structure of Europe.*

Since 1939 the ethnographic structure of Europe has undergone important changes. This paper may be regarded only as a preliminary statement because many of the facts are still unavailable. However, the changes are important enough to be brought to the attention of geographers. The period of changes may be divided into several subdivisions:

1. The repatriation of Germans from the Baltic States, Galicia, Bucovina, Bessarabia, Dobrudja, and the Southern Tyrol in the period 1939–40, following agreements between Germany and Russia as well as with Italy.

2. The settlement of Germans (and some other Germanic people) in former Slavic territory, such as the Baltic, western Poland and Moravia (period 1940–43).

3. The fleeing of the Germans before the advancing Russian armies, especially from East Prussia (1944–45).

4. The expulsion of Germans from the territory occupied by Russia and her Allies (i.e., present Poland), 1945.

5. The organized expulsion of German minorities (Yugoslavia, Czechosolvakia, Hungary), 1946.

6. The possible exchange of minorities, i.e., between Czechoslovakia and Hungary.

If the present shifts are completed, the new ethnographic map of central and eastern Europe will look very different from the pre-war one. After the first World War, the tendency was to draw boundaries according to ethnographic structure, but the present trend is to draw boundaries according to political considerations and adjust the population to those boundaries.

HANS W. WEIGERT—*New Strategic Frontiers in the British Empire.*

The United States is on her way to radically revising her national security system, and these changes have been widely publicized and discussed. The limelight

is on the Canadian Far North and on strategic bases in the northern Pacific. In contrast, an equally important development which is taking form in Britain and which would completely revise the strategic frontiers of the British Empire has been overshadowed by other seemingly more important events. It seems justifiable for the student of political geography to trace such developments at a moment when they have not passed the blueprint stage.

Almost 50 years ago, Halford J. Mackinder envisaged the end of the Victorian seapower age and stressed the importance of continental landmasses and of landpower in the future. British empire strategy seems to be accepting this thesis now. It has become convinced that, in the event of a third world war, the Mediterranean would be too vulnerable and it is prepared to draw radical conclusions. Britain plans on withdrawing all her forces from Egypt. Consequently, she intends to gradually liquidate her strategic bases in Palestine, Transjordan, and even in Iraq. The future protection of her (and the United States') vast interests in the Middle East will be undertaken by a new defense-in-depth system. Britain considers a transfer of her major bases from the eastern Mediterranean to the heart of Africa, with main pillars in Kenya and Nigeria. It is planned to connect these pillars by a 3000-mile road through equatorial Africa, which would make France a partner of the new continental defense system. It would watch and, if possible, control developments in the troubled Middle East zones from positions less exposed than are the present bases in the eastern Mediterranean.

POPULATION AND SETTLEMENT

ROBERT G. BOWMAN (Introduced by Harold H. McCarty)—*Settlement Prospects in Northeastern New Guinea.*

New Guinea, a land of great environmental diversity, holds limited opportunities for additional white settlement. To date less than 10,000 white settlers have been attracted to the island, where they are mostly engaged in plantation enterprises, gold mining, oil prospecting, government service, missionary work, and trading. Ninety per cent of the island is unfit for white settlement, being too high, rough, swampy, heavily forested, or inaccessible. Promising areas for agricultural development are the narrow coastal strip near Port Moresby and the Markham and Ramu valleys in northeastern New Guinea.

There are over 600,000 acres of cultivable land in the latter area, mostly covered with coarse, tropical grasses that have replaced lowland forests as a result of native burning to drive out wild game and provide space for gardens. The native population is small, however, and makes infrequent use of the grasslands. Modern agricultural machinery, properly used, is capable of preparing these grasslands for cultivation inexpensively and quickly. The soils are generally fertile and stand up well to cultivation, being alluvial loams well-supplied with nitrogen, phosphate, potash and organic matter. Army farms in the valleys during the war produced good yields of the common fruits and vegetables, both tropical and temperate.

The gold output of New Guinea reached $10,000,000 in a single year before the

war, most of it coming from the Wau-Bulolo goldfields. Several large oil companies are test-drilling in the Aitape region, and oil in commercial quantities has already been discovered in the Vogelkop. Coal resources are reported to be "very large," and copper, silver, lead, zinc, osmiridium and graphite deposits have already been worked in the southeastern part of the island.

Lumbering prospects are not now promising, but construction of roads to the interior would open up the extensive softwood belt in the highlands and favor increases in hardwood production.

Prospects for hydroelectric development are good. Wartime airstrips could be reconditioned. Lae is an excellent port, and a good highway extends inland to Nadzab.

Climates range from superhumid to tundra (Thornthwaite system). Settlers in the lowlands could find periodic relief from the heat on the plateau, much as settlers near Cairns find respite on the Atherton Tableland in Queensland. The plateau valleys, too thickly populated by natives to accommodate large numbers of whites, could afford recreational facilities without seriously interfering with native life if proper controls are instituted.

Using the Mindanao Exploration Commission's figure of 10 acres of land for each settler, at least 60,000 could be accommodated in farming alone. Obstacles to success are chiefly economic or political. Export markets would have to be found for island produce and perhaps guaranteed for a specified period, and the immigration policy would require some modification.

CHESTER F. COLE (Introduction by Leslie Hewes)—*Factors Relative to Settlement in the Columbia Basin Reclamation Project.*

Future settlement in the Columbia Basin Reclamation Project is subject to the combined effect of a number of factors. Here will be located, in the big bend of the Columbia River, one of the largest irrigation projects which will offer a chance of success to capable farmers with moderate means. The success of the project will be determined in no small part by settlement requirements, soil characteristics, climatic factors, land costs, installation charges for irrigation, costs of irrigation water, availability of irrigation water, costs of land preparation, and types of farming determined by soil characteristics and other factors.

Settlement requirements have not been determined as yet, but undoubtedly some net worth of prospective settlers is desirable. During the first five years of occupance, earnings probably will be below those obtained after the farm lands have been fully developed.

Soils vary from loess material in the northwest and along the eastern margin to coarse sterile sands, but most are alluvial deposits of suitable depth. Irrigable areas have been limited by careful consideration of soil texture, soil depth, drainage, and slope.

Costs include those for land, which by law have been established at $3 to $30 per acre. Installation charges will average $85 per acre—the largest single cost to the prospective farmer. Land preparation costs will vary between $10 and $45 per acre.

Due to the fact that the maximum flow of the Columbia comes in the summer months, there is no question of water availability. Water supply will average about 3.664 acre-feet per acre, but will vary according to land a crop needs. Farming types will include various amounts of cash field crops and livestock enterprises; the amount of each to be determined largely by soil characteristics. Farm size will vary and will be determined by the ability of the land to produce, but in no case can one family own more than 160 acres. On the best land, farms may be as small as 45 acres. More than one-half of the farms probably will be under 80 acres in size. Some farm units will be set up on the plan of rectangular subdivisions and some on the basis of contour subdivision, where topographic conditions warrant.

In the main, the existing cultural landscape will not be an impediment to settlement. Except for railroads, highways, and a few existing small towns, man-made structures are almost non-existent.

STANLEY D. DODGE—*On Changes in the Distribution of Population in Maine.*

Maine is a State of principal importance for the study of changes in the distribution of population, because its long census record very nearly coincides with the whole history of its settlement, and because it still has a "frontier." The population curve is an index recording, decade by decade, the "pressure" of geographical, cultural, and economic circumstances. In the period of settlement, 1770–1840 for western Maine, the rivers were the principal highways and on the meadows along them the first settlements were made. This period of increasing population was one of the rearing of cattle. In 1840, seventy-two towns reached peaks of population; in 1850, ninety-five; in 1860, one hundred six. The towns showing losses between 1840 and 1860 formed a hinterland for Portland, and the economic circumstances were the increased taxes for the improvement of roads, where grain had succeeded cattle as the chief product of the countryside. Revival of several of the towns came with the building of paper mills at falls along the several streams traversing the area. The methods used in working out the population history of western Maine are generally applicable, and help shorten the processes of investigation.

SIGISMOND DER. DIETTRICH—*Florida's Human Resources.*

Florida is one of the fastest growing states in the Union. From 1830 to 1945 the State's population increased from 34,730 to 2,250,061 people. From decade to decade the rate of increase remained steadily above the nation's. There were only two periods, each half a decade, when the increase was below 10 per cent. These were 1915–20 with ½ per cent increase, and 1930–35 with 9.4 per cent. The largest numerical increase, 499,741 persons, occurred during the boom years of 1925–30. This large increase was caused by the influx of migrants. Natural increase accounted for only about one-fifth of the total increase during the decade of 1930–40.

The results of this large-scale in-migration are manyfold. First: without it the State would have a small population today. Second: it saved the economic burden of raising children. Third: since the greatest increases occur in the productive age group of 20–64, people would immediately start working. Fourth: less than half of

the Floridians are native born, 45 per cent among the whites and 61.4 per cent among the Negroes. Fifth: in the near future there will be a large proportion of old people who will have to be maintained by society.

The Floridians are mostly young adults. In 1940 the median age was 28.9 years. Ever since 1900 over half of the population belongs to the economically productive ages of 20–64. There are slightly more women (50.7 per cent) than men in the State.

Florida can be divided into the Mainland and Peninsula, the dividing zone stretching from Jacksonville to Cedar Keys. These two areas are about equal in size. The Peninsula is the more populous, with 79.1 per cent of the population, despite the fact that most of it was a wilderness before 1910. There are only three counties which have Negro majorities, two on the Mainland, one on the Peninsula.

Florida is an urban State. Since 1930 an increasing majority lives in cities and towns. By 1925 over half (57.5 per cent) of the people were urban. The eleven cities with over 25,000 population contain 38.1 per cent of the people. In the three metropolitan census districts live almost one-third (31.2 per cent) of the Floridians. The Peninsula contains almost 90 per cent of the urban people of the State. The Mainland is dominantly rural. There are only three towns there with over 15,000 people. The high degree of urbanization accentuates the spotty distribution of population, particularly on the Peninsula. Non-farm population forms the majority, with 83.9 per cent. Non-agricultural occupations outrank agriculture which normally employs only 17.1 per cent of the labor force. Thus Florida's urban character is further substantiated by the occupational distribution.

EDWARD T. PRICE (Introduced by John Wesley Coulter)—*Two Islands of Dark-Skinned Peoples in Ohio.*

The existence of a number of racial islands of mixed-blood groups in the southern and eastern parts of the United States has long been recognized locally and has been brought into prominence in recent literature. Two small groups of this sort have sprung up in Ohio on the basis of Negro and Indian blood which moved in from the south. One near the village of Carmel in Highland County arose from a mixture of negroes brought in by a Virginia slaveholder and Kentuckians of part Indian blood; these people built their shacks on the property of local farmers and supported themselves by hunting, gathering ginseng and yellow-root, stealing, and sporadic labor. The other group about Longtown in Darke County arose from free persons of color leaving Virginia and other southern states; the colony has consisted since its beginning of farmers owning their own land and respected by their neighbors for honesty and industry. Both groups have apparently decreased in population recently because of movement to areas of better employment—cities and industrialized agricultural areas.

JOSEPH R. SCHWENDEMAN (Introduced by Chauncy D. Harris)—*The Baganda, A Superior Native People of Equatorial Africa.*

The Baganda homeland lies athwart the equator on the northwest shore of Lake Victoria.

This tribe of the Bantu negroes show marked superiority to neighboring tribes in diet, habits of cleanliness, morals, dress, manners, government and other social institutions.

Until recently they have been practically isolated from outside influences. Their physical environment is in every way more favorable than that of their neighbors. The elevation gives the area a modified equatorial temperature of 70° F. monthly mean. Rainfall is adequate for year-round cropping and provides an abundant water supply in lakes and streams. Vegetation and animal life is abundant and varied, with neither the extreme of forest jungle on the one hand nor steppe and desert on the other.

Surface features are rolling-to-hilly and drainage is adequate for the most part. Salt and iron are near at hand. Soils are varied with more than average fertility.

JAMES W. WATSON (Introduced by Chauncy D. Harris)—*Rural Depopulation in Ontario.*

Rural depopulation in Ontario is widespread, except in suburban townships, and townships geographically suited to dairying and "special" crops. Depopulation began about 1851 along the lakeshore of Ontario and Erie; by 1861–71 it had spread through the townships of the South Slope; by 1881 into the Simcoe-Kawartha region; and by 1891 to Muskoka and Haliburton districts. The rural population of the whole province reached a maximum in 1891, since when there has been a decrease of 28 per cent.

Rural decline did not result from physical causes like soil erosion, floods, or lowering of the water table. Depopulation occurred before the maximum number of farms and of acres were occupied. It did not result from the abandonment of unimproved land. It began before the maximum acreage of crops was reached. However, subsequent soil deterioration and recent abandonment of what has come to be, under present economic conditions, marginal land, have aggravated the situation.

There is thus the need to examine to what extent depopulation is due to (1) migration to the cities (increased over 250 per cent since 1901), (2) the replacement of rural services and occupations by urban ones, (3) the decrease in the non-farm population, (4) lower natural increase of the farm population, (5) the changing pattern of settlement within rural areas, (6) the larger size of farms, (7) changes in types of farming with adjustment to local environment and world markets, and (8) the decline in the relative importance of farming in Ontario.

Depopulation is found to be associated with improvement in farming and in living standards, but with deterioration of institutional and social life, particularly as reflected in the school and church. By reason of "cultural lag" these institutions have not adapted themselves to the changes. Different patterns of change in different localities are examined, and are seen to express themselves in different social situations.

Supplement to the Compilation in the *Annals* of December, 1946

1. The last item under Wilson, Leonard S., on page 225, should read: Published in abridged form as "The Geography of a Part of the Northwest Cumberland Plateau of Kentucky, Pt. I, Physical Geography," *Papers of the Michigan Academy of Science, Arts and Letters,* Vol. 23 (1937), pp. 391–402; "Pt. II, Human Geography," *Ibid.,* Vol. 24 (1938), pp. 113–134.
2. The last item under Petty, Julian S., on page 226, should read: Published in full as "The Growth and Distribution of Population in South Carolina," *Bull.* No. 11, South Carolina State Planning Board, State Council For Defense (Columbia, S. C.), 1943, 233 pp., 1 plate.
   Abstract published in *Abstracts of Doctoral Dissertations,* No. 44, The Ohio State University Press, 1944, pp. 81–89.
3. Insert on page 230, as addition to last item under Straw, Harold Thompson, "and Vol. 24 (1938), pp. 71–92."
4. Insert on page 246, under *Pacific Coast,* Kelley, Tim K., "The Commercial Fishery of Washington." Emphasis on locational factors and on fisheries as one phase of regional description and interpretation.
   University of Washington.

REVIEWS AND ABSTRACTS OF STUDIES

STREAM MEANDERS

Important progress toward the understanding of why and how rivers meander is resulting from studies being carried on by the U. S. Waterways Experiment Station at Vicksburg, Mississippi, and from the field investigations of the Mississippi River Commission in the Lower Mississippi Valley.

In "Studies of Meandering of Model-Streams" (*Am. Geophysical Union, Transactions,* 1939, pp. 644–649), Joseph B. Tiffany, Jr., and George A. Nelson report the results of experiments on small, artificial channels through beds of uniform materials, along uniform slopes, for a distance of 50 feet. An initial test in which flow was introduced along the longitudinal axis of the model resulted in a straight channel. In subsequent tests the flow was introduced at an angle of 45° to the slope. Sinuous channels greatly resembling actual meandering streams soon formed and started evolutionary development which led through changes duplicating many details of lower Mississippi River history. Pools were scoured below concave banks, crossings were formed as shallow reaches between bends, and ox-bow lakes were left as a result of cut-offs during the later stages of the experiments. All such processes were accelerated by feeding sand into the water at the channel head.

In "Basic Aspects of Stream-Meanders" (*Am. Geophysical Union, Transactions,* 1941, pp. 632–636), Gerard H. Matthes sets forth certain fundamentals relating to the dynamics of meandering streams. The term, meander, is applied to any letter-S channel pattern, fashioned in alluvial materials, which is free to shift its location and adjust its shape as part of a migratory movement of the channel as a whole down the valley. Merely tortuous or crooked channels are not classed as meanders. A sharp distinction is made between normal and abnormal stream-meanders, the latter being the great loops that normally lead to neck cut-offs and the isolation of ox-bow lakes. Valley-slope, bed-load, discharge, bed-resistance, and transverse oscillation (changes in the slope of the water-surface at right-angles to the axis of flow), are regarded as five of the variables that appear to be basic factors of river-meandering.

A meandering channel, unlike an eroding stream that carves its channel along the path of least resistance, normally builds and refashions its bed and banks out of the materials which it transports. Where bed materials are readily scoured, as through unconsolidated fine sand, channels become wide and shoal. Where beds are somewhat more resistant, but banks are readily caved, as along the concave banks above scour-pools, load is carried downstream, mainly to be deposited on bars lying on the same side of the channel as the caving banks. Most of the load picked up at a caving bank is deposited on the first bar downstream. This bar grows outward as a convex bank, whether the opposite side of the river is free to retreat or is temporarily protected by a revetment. In the latter case, the channel deepens between the advancing bar and the protected bank, eventually attaining sufficient depth to undermine the revetment.

The retreat of a concave bank as a result of attritional erosion by the current is a process too slow to be significant in the morphology of a meandering stream. Only at low stage does the thread of greatest velocity lie close to the concave bank. During rises in stage the thread shifts away from the outside of the curve towards the center of the channel. In the Mississippi River during over-bank stages, as in a great flood, the water along the concave bank is relatively slow, so that steamboat pilots choose it as the path of easiest ascent. The thread of greatest velocity may scour a path across the convex bars in its attempt to approximate the line of maximum valley-slope. The toes of concave banks are undermined during falling stages. It is then that bar-building is most active.

Major departures from normal meander patterns are usually attributable to interference with the methodical transfer of bank-materials. They occur where banks are composed of highly erodible alluvium which caves or crumbles at rates faster than those prevailing in the vicinity. Deformities also occur as a result of local resistance to normal rates of bank-caving, such as commonly arises where lenses of tightly compacted silts or clays are encountered along banks. These lenses are typical of many alluvial deposits, owing their origin to sedimentation in ox-bow lakes and abandoned secondary channels. Only the finer suspended silt-particles carried overland by flood-waters settle out in such lakes and channels. In a compacted state the resulting silt-bodies ("clay plugs") commonly form tough deposits of such magnitude as to become important barriers to the normal shifting of a meandering river. Lower Mississippi Valley alluvium is not homogeneous in character; its internal differences wield a marked influence in promoting distortions of the meander-pattern.

In "A Laboratory Study of the Meandering of Alluvial Rivers," *U. S. Waterways Experiment Station,* 1945, 40 pp., 61 pl., 62 references, J. F. Friedkin discusses basic principles of meandering, effects of bank stabilization, and laboratory technique of model studies. A serious attempt to isolate each variable among those regarded as basic factors of river-meandering, combined with the observation of channel depths in detail not attempted previously, confirmed all conclusions advanced by Tiffany, Nelson, and Matthes, as well as adding a huge store of quantitative information about the whole problem of meandering. The use of green sand along concave banks flanking the left of the channel and red sand along the right demonstrated the validity of the "trading" concept, the generalization that load derived from a cut-bank, concave in plan, is deposited mainly on the next bar downstream, at the next convex bank. Variations in stage so changed threads of maximum velocity that low-stage channels deteriorated under high-stage discharges. Variations in the amount of sand fed into the laboratory streams changed channel patterns considerably, slopes flattened and channels deepened in parts of the laboratory rivers where currents had insufficient sand to develop typical meanders. Variations in discharge demonstrated how bends with larger radii result from increased volumes of water. A steepening of down-valley slope also increased the size of bends. The total length of channel, however, is decreased along a channel with larger bends. No deepening of the channel occurred as a result of doubling the discharge.

The cross sections and shapes along a meandering stream depend mainly on the rate at which load is applied. It is fallacious to assume that increases in slope or discharge will result in channel deepening. Increased velocities commonly increase bank erosion, with the result that channels widen and shoal. Extremely wide, shallow channels attain braided patterns and have little tendency to erode banks. Crossings or reaches, where at least a semi-braided condition exists, constitute about 20 per cent of the length of the Mississippi River between Cairo and Baton Rouge. Tendencies toward braiding are most pronounced where gradients are steepest. The main effect of channel shortening, such as occurs artificially where cut-offs are dredged, is that of promoting channel widening and shoaling, rather than that of increasing channel depth as is popularly supposed.

In "Geological Investigation of the Alluvial Valley of the Lower Mississippi River," *Mississippi River Commission,* U. S. War Department, Corps of Engineers, 1944, 78 pp., 80 figs., 11 tables, 33 pl., Harold N. Fisk presents a wealth of factual data on river history such as has never been assembled elsewhere. With regard to meandering, shown in detail is complete confirmation of the works reviewed above, by actual examples from the valley.

The presence of lenticular masses of tight silt, "clay plugs," the effect of fault-zones, and the rôle of earlier channels are shown to be extremely significant factors in modifying meander patterns. Though the Mississippi has followed several different meander belts within the last two thousand years, each has about the same length of channel, a proof that the river is in a "poised" condition, without tendencies either to aggrade or degrade its alluvial valley. Meandering occurs only where the river is able to scour its bed and cave its banks. Channels become deep, narrow, and fixed in position where beds can not be scoured rapidly enough to lead to meandering. This happens in places where the river cuts through alluvium into Tertiary bedrock or into Pleistocene clay formations. Where scour and bank-caving are excessive, the channel tends to braid, a condition found commonly above Helena, where the alluvium contains considerable bodies of sand and coarse silt. Reaches contain many bars and islands, and chute cut-offs are numerous. In somewhat finer and tighter alluvial fill between Helena and Baton Rouge, the channel tends to be narrower and deeper. Here the river meanders freely and exhibits patterns to a large extent controlled by clay plugs. Below Baton Rouge the channel is extremely deep and narrow. Meandering hardly occurs because the channel is unable to scour its bed or cave its banks rapidly enough in the tight Pleistocene, or Recent deltaic, clays it flows across.

It may be difficult for many geomorphologists to adjust themselves to the detailed factual data contained in Fisk's report. Hypothesis and diagrammatic representation are lacking, to a degree that may be hard to appreciate. As an indication of the exactness of the many plates and figures that supplement the text it might be stated that although the contours on the map showing the topography of the last low-sea-level, pre-Recent, valley or base of the alluvium were drawn about three years before the report was published, and though several thousand additional borings have been made through the alluvium since, no contour has needed significant re-location. Values such as 575 cubic miles of alluvium between the Louisiana-Arkansas boundary and Cape Girardeau are almost precise.

The identification of nearly forty stages in the development of the Mississippi River, and the mapping of courses for the river during the latest part of this history, for a period extending back more than two thousand years, involves a great deal of interpretation, but this work has been done by highly trained specialists and their main conclusions are certain to stand, though many details may be modified as a result of future field studies.

Since the publication of Fisk's report a detailed investigation of clay plugs has been made, so that all of the major obstructions to free meandering of the Mississippi are now known as to location, volume, and thickness. The entire problem of river control is now planned in accordance with the pattern and distribution of these key points along the meander belt.

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PRESENT STATUS OF "THE GREAT SOVIET WORLD ATLAS" IN THE UNITED STATES

"The Great Soviet World Atlas" Vol. I; Part 1, *Maps of the World;* Part 2, *Maps of the Union of Soviet Socialist Republics;* Moscow, 1938. "The Great Soviet World Atlas" Vol. II; Part 1, *Political-Administrative, Survey, Economic and Physical Maps of U.S.S.R.;* Part 2, *Historical Maps of the Civil War in U.S.S.R.* Moscow, 1939. Published by the Central Executive Committee and the Commissars of the Soviet Nationalities of the U.S.S.R. By decree of December 17, 1933. Under the principal direction of the Geodesy and Cartography Units, C.S.N., U.S.S.R.

Since 1921, upon the advice of Lenin, the U.S.S.R. has been engaged in planning the production of a Great World Atlas founded in the tradition of the older National Atlases which are available for many European countries. Most recent of these national atlases, the available Soviet publication, while closely following the pattern of the Swedish *Världsatlas,* surpasses any other atlas both in the technical aspects of production and in the content of the work. Volume I, published in 1938, was given a general circulation throughout the world and was proudly presented as an outstanding example of geographic and cartographic research in the U.S.S.R. Many copies have been distributed in the United States and it served as the greatest source of U.S.S.R. maps for the citizens of the United States.[1] Details of the contents are available in a companion volume and it will suffice to note that the contents of the original Volume I comprise 83 maps of the world portraying physical, economic, historical, and demographic distributions. Of special interest may be mentioned a general rainfall map covering the oceans as well as the continents, a gravimetric map, a general soils map and a map of climatic types. An additional series of 36 maps shows the whole of the U.S.S.R. in a single sheet and larger scale maps of European Russia. Also contained in the second part are an excellent series of geologic, glacial, physiographic, minerals, soils, and vegetation maps. These together with 27 diagrams presenting economic conditions are a basic reference to Russian affairs. By itself, Volume I must be considered a most significant contribution to the growing list of National Atlases.

Volume II, published the following year, has served the British and American Governments as the primary source for all information relative to the geography of the U.S.S.R. It is not so well known in this country or Britain as Volume I because of the war. Upon opening of hostilities in 1939, the distribution of Volume II was halted. With considerable reason the government of the U.S.S.R. held that the availability of a recent detailed Atlas of U.S.S.R. was not in the best interest of national security. As a result only three copies are available in the United States. One is the property of the Department of State, a second is located in the War Department, and a third copy was housed in the Soviet Embassy in Washington.[2] No copies were available to the British until 1944.

The OSS, faced with a growing need for information about Russia in 1942 and 1943, attempted to photocopy this volume. However, the complicated plates, some of which contain

[1] A most helpful companion volume to the original Atlas Volume I was prepared by Andrew Perejda and Vera Washburne under the direction of George B. Cressey in 1940. Copies are available through Edwards Brothers, Ann Arbor, Michigan. A complete translation of all titles and legends comprise the contents of the volume.

[2] It is of interest to note that Map Intelligence teams of the OSS procured several copies from various German Map agencies early in 1945.

over 40 colors, hues and shades, rendered such a solution impossible. Bids were accepted from several commercial firms for a regular color-press run, but in every instance a delay of several years and an estimated cost in excess of $150,000 was encountered. Attention was given to the possibility of making a color-photographic reproduction of the atlas. Discussions with the Special Color Laboratory of OSS resulted in a satisfactory, although slightly reduced reproduction.[3] Finally, on February 1, 1943, the Map Information Section, Geography Division, OSS, began a restricted distribution of the reproduced volume. Circulation was limited to War Agencies of the Federal Government and two copies were supplied to the British Government. The Geographical Section, General Staff, and the Prime Ministers' Map Room served as depositories of the copies. There has not been any general distribution of Volume II in the United States. Many unverified accounts have been circulated regarding the unwillingness of the Soviet Government to release copies. The atlas was submitted to governmental censors for approval and according to unverified reports all regular maps were carefully censored. However, the inset plates were overlooked.

According to the authors of Volume II, the primary purpose of the work was to make available a detailed physical and economic geography of the U.S.S.R. in maps. The relatively large scales used on many of the maps, and the elaborate economic presentation, demonstrate the success of the project and stand as a tribute to the Soviet geography and cartography professions. There is no other comparable work.

The atlas can be criticized on two points. The economic maps, while beautiful examples of off-set press work and cartographic skill, suffer greatly from overcrowding. In many instances the complicated symbols necessary for a page-size map on a scale of 1 : 2,500,000 carrying a total of 125 different categories render the map difficult if not impossible to read. A second point of criticism is the fact that the publishers did not see fit to publish the atlas in any language other than Russian. If the Soviet government had followed the procedure of Netherdandsch-Indië Topografischen Dienst in publishing the "Atlas van Tropisch Nederland" in Dutch, French, German, and English, the entire Atlas would be a more valuable research tool. It was necessary to prepare a table of contents for the OSS reproduction so that some rapid means of orientation would be available.[4]

It is fairly certain that the final volume of the Atlas has been released in Russia. No copies were available in the United States during 1946 and no information is available concerning the contents of Volume III.

[3] The TRIAK Color Process was found most satisfactory and superior to either Kodachrome or Agfacolor. The original plates measure 10 × 17 7/8 inches while the color photographs are 15 × 8½ inches.

APPENDIX
Table of Contents
Volume II
Political-Administrative, Survey, Economic, and Physical Maps of U.S.S.R.

Plate	Title	Scale
9–10	Political-Administrative Map of USSR	1 : 15,000,000
11	Map of Population Density, European USSR	1 : 10,000,000
	Supplementary maps:	
	Moscow and Adjoining Area	1 : 2,000,000
	Leningrad and Adjoining Area	1 : 2,000,000
	Donbass	1 : 2,000,000
12	Map of Population Density, Asiatic U.S.S.R.	1 : 20,000,000
	Supplementary map:	
	Fergana Valley	1 : 5,000,000
13–14 –15	Political-Administrative Map of U.S.F.S.R.	1 : 10,000,000
	Supplementary map:	
	Moscow and Environs	1 : 500,000
16–17	Moscow, Tula, Ryazan, Ivanovo and Yaroslavl Oblasts—Survey Map	1 : 500,000
	Supplementary maps:	
	Yaroslavl	1 : 250,000
	Ivanovo	1 : 250,000
18–19	Moscow, Tula, Ryazan, Ivanovo and Yaroslavl Oblasts—Economic Map	1 : 500,000
	Supplementary maps:	
	Moscow Industrial District—Western Part	1 : 500,000
	Moscow Industrial District—Eastern Part	1 : 500,000
20–21	Moscow City Plan	1 : 50,000
22	Moscow, Growth and Reconstruction	
	A. General Plan of the Reconstruction of Moscow	1 : 150,000
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23	Moscow-Volga Canal	1 : 500,000
24–25	Leningrad Oblasts—Survey Map	1 : 1,500,000
26	Leningrad with Environs	1 : 350,000
27	Karelian A.S.S.R. and Murmansk Oblasts—Survey Map	1 : 2,500,000
28	Leningrad Oblast—Economic Map	1 : 2,000,000
	Supplementary map:	
	Leningrad Industrial Center	1 : 1,000,000

[4] Because of the limited number of copies available in this country, and because of the value of the Atlas to students of the U.S.S.R., there is appended to this review a translation of the table of contents for Volume II. The translation was done by members of OSS.

29	Karelian A.S.S.R. and Murmansk Oblast—Economic Map	1 : 2,500,000
30	Stalin White Sea–Baltic Canal	1 : 750,000
	Supplementary map: White Sea–Baltic Waterway	1 : 3,500,000
31	Arkhangelsk Oblast and Komi A.S.S.R.—Economic Map	1 : 6,000,000
	Supplementary maps: Saw Milling Industry of Arkhangelsk in 1935	1 : 500,000
	Exploitation of Timber in Arkhangelsk Oblasts and Komi A.S.S.R.	1 : 12,000,000
32–33	Arkhangelsk Oblast and Komi A.S.S.R.—Survey Map	1 : 3,000,000
	Supplementary maps: Novaya Zemlya	1 : 5,000,000
	Franz Josef Land	1 : 5,000,000
	Mouth of Northern Dvina	1 : 500,000
34	Vologda Oblast—Survey Map	1 : 2,000,000
35	Vologda Oblast—Economic Map	1 : 2,000,000
	Supplementary map: Exploitation of Timber in the Vologda Oblast	1 : 5,000,000
36–37	Kalinin, Smolensk and Orel Oblasts—Survey Map	1 : 1,500,000
	Supplementary maps: Kalinin	1 : 250,000
	Smolensk	1 : 250,000
	Bryansk and Ordzhonikidzegrad	1 : 250,000
38	A. Kalinin and Smolensk Oblasts—Economic Map	1 : 2,500,000
	B. Orel Oblast—Economic Map	1 : 2,500,000
	Supplementary map: Bryansk Industrial District	1 : 1,000,000
39	Kursk, Voronezh and Tambov Oblasts—Economic Map	1 : 2,000,000
40–41	Kursk, Voronezh and Tambov Oblasts—Survey Map	1 : 1,500,000
	Supplementary map: Voronezh	1 : 250,000
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	Supplementary map: Pavlov Vach Industrial Area	1 : 750,000
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	B. Chuvash A.S.S.R.—Economic Map	1 : 1,500,000
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	A. Samara Bend—Survey Map	1 : 500,000
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49	A. Mordvin A.S.S.R.—Economic Map	1 : 1,500,000
	B. Chkalov Oblast—Economic Map	1 : 3,000,000
	Supplementary maps: Orsk-Khalilovo Industrial District of the Chkalov Oblast	1 : 1,000,000
50	Saratov and Stalingrad Oblasts; German Volga and Kalmyk A.S.S.R.'s—Economic Map	1 : 2,500,000
	Supplementary map: Saratov and Engels	1 : 500,000
51	Saratov Oblast and German Volga A.S.S.R.—Survey Map	1 : 1,500,000
	Supplementary map: Saratov and Engels	1 : 250,000
52	Stalingrad Oblast and Kalmyk A.S.S.R.—Survey Map	1 : 2,000,000
	Supplementary maps: Stalingrad	1 : 375,000
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55	Crimean A.S.S.R.—Economic Map	1 : 1,500,000
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	Sochi	1 : 250,000
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61–62	Ordzhonikidze Krai, Dagestan, Kabardino-Balkar, North Ossetian and Checheningush A.S.S.R's—Economic Map	1 : 1,500,000
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	Non-ferrous Metals, Oil and Associated Industries of the North Ossetian and Checheningush A.S.S.R.'s in 1935	1 : 1,500,000
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78	Industry of Kuzbass—Economic Map	1 : 1,000,000
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94	Maritime Krai and Southern Part of Khabarovsk Krai—Economic Map	1 : 5,000,000
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	Supplementary maps:	
	Minerals and Geological Exploration of the Soviet North	1 : 25,000,000
	Economic Map of the North before the Revolution (within the borders of the USSR)	1 : 25,000,000
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	Kharkov	1 : 250,000
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	Dnepropetrovsk	1 : 500,000
	Zaporozhe	1 : 250,000
101–102	Ukrainian S.S.R., Central Part—Survey Map (Vinnitsa, Zhitomir, Kamenets-Podolsk, Kirovograd, Kiev, Nikolayevsk, Odessa and Chernigov Oblasts and Moldavian A.S.S.R.)	1 : 1,500,000
	Supplementary map:	
	Odessa	1 : 250,000
102A	Ukrainian S.S.R., Western Part—Survey Map (Volhynia, Drohobych, Lvov, Rovno, Stanislav and Tarnopol Oblasts)	1 : 1,500,000
103–104	Ukrainian S.S.R.—Economic Map	1 : 2,000,000
105	Industry of Donbass in 1913—Economic Map	1 : 750,000
106	Industry of Contemporary Donbass—Economic Map	1 : 750,000
107–108	Belorussian S.S.R.—Political-Administrative Map	1 : 1,500,000
107A –108A	Belorussian S.S.R.—Survey Map	1 : 1,500,000
108B	Belorussian S.S.R.—Economic Map	1 : 1,500,000
109–110	Physical Map of the Caucasus	1 : 2,500,000
	Supplementary map:	
	Humid Subtropical Region of the Caucasus	1 : 750,000
111	Azerbaidzhan S.S.R.—Survey Map	1 : 1,500,000
	Supplementary map:	
	Baku	1 : 280,000

112	Azerbaidzhan S.S.R.—Economic Map	1 : 1,500,000
	Supplementary map: Baku Oil Area	1 : 500,000
113	Georgian S.S.R.—Survey Map	1 : 1,500,000
	Supplementary map: Tbilisi	1 : 250,000
114	Georgian S.S.R.—Economic Map	1 : 1,500,000
115	Humid Subtropics of the Georgian S.S.R.—Economic Map	1 : 750,000
116	Power Resources and Electrification of Azerbaidzhan S.S.R., Georgian S.S.R. and Armenian S.S.R.—Economic Map	1 : 2,000,000
117	Armenian S.S.R.—Survey Map	1 : 1,000,000
	Supplementary maps: Yerevan	1 : 250,000
	Lake Sevan	1 : 500,000
118	Armenian S.S.R.—Economic Map	1 : 1,000,000
	Supplementary maps: Industry in 1913 within the Territory of the Armenian S.S.R.	1 : 3,000,000
	Industry of the Armenian S.S.R. in 1935	1 : 3,000,000
119–120	Turkmen S.S.R.—Survey Map	1 : 2,500,000
	Supplementary maps: Krosnovodsk	1 : 250,000
	Ashkhabad	1 : 250,000
121	Turkmen S.S.R.—Economic Map	1 : 3,000,000
122	Uzbek S.S.R.—Survey Map	1 : 4,000,000
	Supplementary maps: Tashkent	1 : 250,000
	Middle Course of the Chirchik River	1 : 500,000
123	Uzbek S.S.R., Eastern Part—Survey Map	1 : 2,500,000
	Supplementary maps: Khorezm Oasis	1 : 750,000
	Bukhara Oasis	1 : 500,000
124	Uzbek S.S.R.—Economic Map	1 : 2,500,000
	Supplementary map: Kara-Kalpak A.S.S.R.	1 : 4,000,000
125	Fergana Valley—Economic Map	1 : 750,000
126	Tadzhik S.S.R.—Survey Map	1 : 2,500,000
	Supplementary map: The Lofty Pamir Mountain	1 : 500,000
127	Tadzhik S.S.R.—Economic Map	1 : 2,500,000
	Supplementary map: Vakhsh Valley	1 : 500,000
128–129	Kazakh S.S.R.—Survey Map	1 : 5,000,000
	Supplementary map: Alma-Ata	1 : 250,000
130–131	Kazakh S.S.R.—Economic Map	1 : 5,000,000
132	Kirgiz S.S.R.—Survey Map	1 : 2,500,000
	Supplementary map: Frunze	1 : 250,000
133	Kirgiz S.S.R.—Economic Map	1 : 2,500,000
	Supplementary map: Chu Valley	1 : 1,250,000

PART TWO
HISTORICAL MAPS OF THE CIVIL WAR IN THE U.S.S.R.

Plate		
134 (upper)	A. Tov. I. V. Stalin on the Front of the Civil War, 1918–1920	1 : 12,500,000
(lower)	B. Tov. K. E. Voroshilov on the Fronts of the Civil War, 1918–1920	1 : 10,000,000
135–136 (upper left)	A. Establishment of Soviet Rule in Russia, October 25 (November 7)–January 31 (February 13), 1918	1 : 25,000,000
(upper right)	B. Campaign of the Heroic Army of Tov. K. E. Voroshilov from the Donbass to Tsaritsyn, March–June 1918	1 : 5,000,000
(lower left)	C. Beginning of Intervention and the First Period of the Civil War, February–August 1918	1 : 20,000,000
(lower right)	D. Beginning of Intervention and the First Period of the Civil War, September 1918–February 1919	1 : 20,000,000
(center inset)	E. Intervention in the Far East in 1918	1 : 30,000,000
137 (upper left)	A. Heroic Defense of Tsaritsyn under the Leadership of Tov. I. V. Stalin and K. E. Voroshilov—First Encirclement, July–September 1918	1 : 2,500,000
(lower left)	B. Heroic Defense of Tsaritsyn under the Leadership of Tov. I. V. Stalin and K. E. Voroshilov—Second Encirclement, September–November 1918	1 : 2,500,000
138 (upper right)	C. Smashing of the First Campaign of the Entente, March–August 1919	1 : 15,000,000
(lower right)	D. Heroic Defense of Petrograd under the leadership of Tov. I. V. Stalin, May–August 1919	1 : 2,500,000
139 (upper left)	A. Smashing of the Second Campaign of the Entente, October 1919–April 1920	1 : 15,000,000
(lower left)	B. Smashing of the Third Campaign of the Entente, April–November 1920	1 : 7,500,000
140 (upper right)	C. Smashing of Wrangel, October 28–November 16, 1920	1 : 3,000,000
(lower right)	D. Battle Course of the First Cavalry, 1918–1921	1 : 7,500,000
141 (upper left)	A. Civil War in the Caucasus, 1918–1919	1 : 5,000,000
(lower left)	B. Civil War in Siberia and the Far East from 1918 to April 1920	1 : 20,000,000
142 (upper right)	C. Liberation of the Caucasus from the Remnants of Denkin's Army and the Bourgeoisie-Nationalist Counter-Revolutionary Government, 1920–1921	1 : 5,000,000

(lower right) D. Liberation of Siberia and the Far East from Interventionists and the "Whites" from April 1920 to 1925 1 : 15,000,000

143 (upper) A. The Civil War in Central Asia and Kazakhstan, October 1917–Summer 1919 1 : 12,500,000

(lower) B. The Civil War in Central Asia and Kazakhstan, Summer 1919–1922 1 : 12,500,000

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SITE AND SITUATION OF VIENNA

Hassinger, Hugo: "Boden und Lage Wiens," *Mitteilungen der Geographischen Gesellschaft Wien*, Bd. 84 (1941), Heft 10–12, pp. 359–84.

Vienna, for centuries the most significant political, economic, and cultural center of East-Central Europe, has long been a favorite topic among urban geographers. Situated at the crossroads of the middle Danube where the east-west route of the river meets the ancient north-south "amber" road, Vienna is among the classical examples of urban development; both natural and cultural features contributed to its rise, and of late, to its decline. Professor Hassinger, the author of a long series of urban studies dealing with Vienna, made what may well have been the last survey of Vienna during the German regime, and attempted to portray briefly the rise and present character of his native city.

The Vienna Basin, in spite of its small size, is one of Europe's best defined natural regions. It is essentially a region of routes, and of gateways channelling traffic of all kinds into several major directions. The so-called "Vienna Gate," at the northwestern end of the Basin, leads towards the Bohemian uplands and also, following the valley of the Danube, to Bavaria; while the southwestern gate of the Basin carries the traffic towards Styria, Carinthia, Slovenia, and the Adriatic. It is interesting to note that it was not until the 13th century that the Semmering Pass became important in this southwestern route; up to that time the trade routes followed the easternmost foothills of the Alps, turning westward only after reaching the neighborhood of Pettau (Ptuj), the Poetovio of the Romans. To the east and southeast the Vienna Basin is limited by the low hills connecting the Alps and Carpathians, hills traversed by the Danube in the "Porta Hungarica," just above Bratislava, and by three easy passageways, near Bruck on the Leitha, Hainburg, and Sopron, these three carrying all road and railroad traffic between Vienna, Hungary, and Slovakia. It was largely the combined effect of these gateways, and the routes leading through them, and of the character of the Basin, uniting within it the "geographical energies" (a term employed by Professor Cholnoky in his essay on Vienna, cf. *Mitt. Geog. Ges. Wien*, 1929, pp. 380–94) rising from the contact of widely divergent economies of Alpine highland, Hungarian plain, and Austrian-Bohemian hills, that made Vienna the metropolis of the Danube valley.

The principal Roman settlement of the Vienna Basin was Carnuntum, some 30 miles downstream from Vienna, located near the confluence of the Danube and the Morava, where it could easily defend the Roman frontier of the Danube against barbarian attacks from the north. It was only during the Carolingian period, when the frontier began to follow a north-south line, instead of the east-west line of the Danube, that Carnuntum (near Petronell) lost its importance and the Vindobona of the Romans, the ancestor of modern Vienna, rose to be the principal town of the Vienna Basin. Vindobona was located on a high bluff overlooking the wide floodplain of the Danube, and its principal streets may still be found within the inner core of modern Vienna.

Modern Vienna, according to Hassinger, may be compared to a seashell: surrounded by hills on three sides, from northeast to southeast, and bounded by the floodplain of the Danube on the fourth side, the expansion of the city was severely hampered for centuries by both natural and man-made obstacles. Even today features of the relief determine the location of boulevards and residential sections. The series of marine terraces surrounding the Danube in a semicircle became the sites of various quarters of the city; in the gardens of the famous Belvedere residence, for instance, the architect and town planner of the early 18th century utilized the natural terrace and transformed it into one of the most beautiful formal gardens of Europe. In the western and northwestern section of Vienna the expansion of the settlement area was severely hampered by the relief: the ridges of hills and low mountains surrounding the city broke up the wave of urban settlers and created a series of long, narrow strips of semi-rural character, where the old villages built around

vineyards mingle with the modern residences of people commuting to Vienna.

During the Nazi occupation, in 1938, the administrative limits of Vienna were expanded to include most of the Vienna Basin. In one of his isochrone maps, Hassinger demonstrates clearly that the Nazi planners based the reorganization of the Vienna region on communications: in most cases the boundary of the new "Gau Wien" coincides with the 60-minute isochrone, measured in terms of railroad or bus travel from the center of Vienna.

The outcome of World War II is likely to be of even greater influence on the future of Vienna than the debacle of the Austro-Hungarian monarchy in 1918. Vienna today is in the critical region where eastern and western influences converge and—far too often for the comfort and well-being of the Viennese—conflict. It is interesting to note in this respect that Hassinger's article, written at the height of the German tide of conquest, ends on a warning note. The author points out that while Vienna was the greatest railroad center of East-Central Europe, it neglected the advantages offered by waterways. The Danube, if connected with the Rhine, the Oder, and the Elbe, could make Vienna the nerve center of all water travel between the Black Sea, the Baltic, and the North Sea. In view of recent events, this emphasis on the rôle of the Danube is worth reiterating, for on it may depend much of the prosperity of Vienna in the near future.

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